

JPRS 68420

30 December 1976

USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS
PHYSICS AND MATHEMATICS
No. 31



DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

U. S. JOINT PUBLICATIONS RESEARCH SERVICE

REPRODUCED BY
**NATIONAL TECHNICAL
INFORMATION SERVICE**
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

**Reproduced From
Best Available Copy**

20000308 093

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22151. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Indexes to this report (by keyword, author, personal names, title and series) are available through Bell & Howell, Old Mansfield Road, Wooster, Ohio, 44691.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

BIBLIOGRAPHIC DATA SHEET	1. Report No. JPRS 68420	2.	3. Recipient's Accession No.
4. Title and Subtitle USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS - PHYSICS AND MATHEMATICS, No. 31		5. Report Date 30 December 1976	
7. Author(s)		6.	
9. Performing Organization Name and Address Joint Publications Research Service 1000 North Glebe Road Arlington, Virginia 22201		8. Performing Organization Rept. No.	
		10. Project/Task/Work Unit No.	
		11. Contract/Grant No.	
12. Sponsoring Organization Name and Address As above		13. Type of Report & Period Covered	
		14.	
15. Supplementary Notes			
16. Abstracts The report contains abstracts on aerohydrodynamics, magnetohydrodynamics, thermodynamics, physics of crystals and semiconductors, molecular, atomic and plasma physics, optics, spectroscopy, physical measurements, and on theoretical and applied mathematics.			
17. Key Words and Document Analysis. 17a. Descriptors USSR Lasers Eastern Europe Nuclear Physics Mathematics Structural Mechanics Acoustics Thermodynamics Optics Plasma Physics			
17b. Identifiers/Open-Ended Terms			
17c. COSATI Field/Group 12A, 20A, 20F, 20E, 20H, 20K, 20M, 20I			
18. Availability Statement Unlimited Availability Sold by NTIS Springfield, Virginia 22151		19. Security Class (This Report) UNCLASSIFIED	21. No. of Pages 129
		20. Security Class (This Page) UNCLASSIFIED	22. Price

JPRS 68420

30 December 1976

USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS
PHYSICS AND MATHEMATICS

No. 31

This serial publication contains abstracts of articles from USSR and Eastern Europe scientific and technical journals on the specific subjects reflected in the table of contents.

Photoreproductions of foreign-language sources may be obtained from the Photoduplication Service, Library of Congress, Washington, D. C. 20540. Requests should provide adequate identification both as to the source and the individual article(s) desired.

CONTENTS	PAGE
Acoustics	1
Crystals and Semiconductors	26
Electricity and Magnetism	45
Fluid Dynamics	55
Lasers and Masers	60
Magnetohydrodynamics	70
Molecular Physics	71
Nuclear Physics	73
Optics and Spectroscopy	104
Stress, Strain and Deformation	111
Superconductivity	117
Theoretical Physics	122
Thermodynamics	125

USSR

UDC 534.286-8

GOLIK, A. Z., KUZOVKOV, YU. I., and TARASENKO, O. V., Kiev State University
imeni T. G. Shevchenko

STUDY OF ELASTIC AND VISCOUS PROPERTIES OF MOLECULAR FLUIDS ALONG THE LIQUID-
VAPOR EQUILIBRIUM LINE. I. ULTRASOUND PROPAGATION VELOCITY. II. ADIABATIC
ELASTICITY MODULUS

Kiev UKRAINSKIY FIZICHESKIY ZHURNAL in Russian Vol 21, No 9, Sep 76
pp 1492-1495 manuscript received 20 Feb 76

[Abstract] This work is dedicated to the study of the propagation velocity
of ultrasound in molecular fluids and the elastic properties of molecular
liquids along the liquid-vapor equilibrium line over a broad range of
temperatures. The objects of investigation were n-paraffins from pentane
to tetracosane inclusively. The studies cover a temperature range of 20-
250°C, with ultrasound velocity c measured using the pulse phase method at
45 MHz, error of determination of c not exceeding 0.3%. The mean deviation
of theoretical values of modulus from experimental values is not over 0.7%,
indicating that for quantitative description of the temperature dependence
it is sufficient to limit oneself to the quadratic term in the expansion
1/2

USSR

GOLIK, A. Z., KUZOVKOV, YU. I., and TARASENKO, O. V., UKRAINSKIY
FIZICHESKIY ZHURNAL Vol 21, No 9, Sep 76 pp 1492-1495

of P^* in a Taylor series with respect to powers of $T_k - T$, where $P^*(T)$ is
the spinodal pressure and T_k is the critical point. References 11 Russian.

USSR

KLYUKIN, I. I. and MYUSNIKOVA, YE. N.

THE TENTH ANNIVERSARY OF THE LENINGRAD ACOUSTICAL SEMINAR, SCIENTIFIC COUNCIL ON ACOUSTICS, ACADEMY OF SCIENCES USSR

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 22, No 5, Sep-Oct 76 p 784

[Abstract] The permanent Leningrad Acoustical Seminar of the Scientific Council on Acoustics, Acad. Sci. USSR at the Leningrad Shipbuilding Institute is now ten years old. In the ten years of its existence, the Seminar has held over 70 sessions, hearing some 300 scientific reports on various trends in the physics and technology of acoustics: propagation and diffraction of waves, noise and vibration, ultrasound, electroacoustics, hydroacoustics, physiological acoustics, pattern recognition, etc. The Seminar meets monthly, following agendas made up by the Bureau of the Seminar, which was part of the composition of the organizational committee of the Seventh All-Union Acoustical Conference held in Leningrad in 1971.

1/1

USSR

UDC 534.2

KOLESNIKOV, G. I., STARUNOV, V. S. and FABELINSKIY, I. L., Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR

PROPAGATION OF LONGITUDINAL AND SHEAR HYPERSONIC WAVES IN FLUIDS

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 22, No 5, Sep/Oct 76 pp 776-777
manuscript received 9 Mar 76

[Abstract] The basic results are reported from studies performed by the authors on the temperature dependence of characteristics of propagation of transverse and longitudinal hypersound in liquids based on the spectra of molecular scattering of light. The light scattered was produced by an Ne-He laser and observed at angle $\theta=90^\circ$. The light scattering spectrum produced using a Fabry-Perot interferometer was scanned by changing the pressure, the spectrum was recorded by the method of photon counting. Based on the resultant, the optimal experimental conditions can be judged for investigation of the propagation of shear waves in low-viscosity liquids by the acoustical method. The results presented show that molecular scattering of light is a good tool for the study of the nature of propagation of longitudinal and transverse high frequency sound in liquids. 12 references.

1/1

USSR

UDC 546.45:534.29:621.374.55

BERSHADSKIY, YE. YA., POTREKIY, A. V., FEDOROV, A. P., and KHOTIMLER, L. A.

BERYLLIUM OXIDE CERAMIC AS A MATERIAL FOR THE SOUND CHANNELS OF ULTRASONIC
DELAY LINES

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 22, No 5, Sep-Oct 76 p 770
manuscript received 4 Jan 76

[Abstract] The values of elasticity constants of a beryllium oxide ceramic delay line were found by measurement of the propagation velocities of transverse and longitudinal waves in rod specimens 80 mm long by the pulse method. The measurements were performed at 10 and 15 MHz. X and Y sections of quartz were used as radiation transmitters and receivers. The comparatively low sound transmission and low specific delay indicate that beryllium oxide ceramic is unsuitable as a material for acoustic lines with delays on the order of hundreds of microseconds due to the great length of lines required and attenuation introduced. However, these very properties may be useful for "short" delay lines when the determining characteristics are accuracy of delay time and low level of triple signal. Beryllium oxide ceramic is therefore a promising material for the planning of precision calibrators and multichannel ultrasonic delay lines with high accuracy of short delay times. References 2: 1 Russian, 1 Western.
1/1

USSR

UDC 534.86

ANDREYEV, S. P., and GORDON, M. G., All-Union Scientific Research Institute
for Cinematography

DISTORTION OF SOUND SIGNALS IN AUTOMATIC GAIN CONTROL SYSTEMS

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 22, No 5, Sep/Oct 76 pp 766-767
manuscript received 10 Nov 75

[Abstract] A detailed study is presented of phenomena related to the delay of the control signal in the AGC regulation loop. It is shown that the delay has a basic influence on the nature of operation of the AGC system, with specific distortions of sound signals, detectable by ear, sometimes arising. The ability to decrease the distortions related to delay is practically limited by the operating speed of the AGC system; therefore, calculation of the dynamic characteristics of AGC must be performed considering the delay, which can be done using equations given in this article. References 2: 1 Russian, 1 Western.
1/1

USSR

UDC 534.22

OSTROVSKIY, L. A. and SOUSTOVA, I. A., Scientific Research Institute for Radiophysics, Gor'kiy

THEORY OF PARAMETRIC SOUND GENERATORS

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 22, No 5, Sep/Oct 76 pp 742-748
manuscript received 4 Jan 76

[Abstract] A study is made of the nonlinear interaction of three arbitrary modes with different transverse structures in an acoustic resonator. The thresholds of parametric emission are determined with soft and hard excitation, as well as the amplitudes of all modes in the steady state, it is shown that the amplitude of the pumping field is fully limited. The peculiarities of liquid and solid-state waveguide parametric sound generators are discussed. The conclusions of the theory agree well with the experimental data. The resonator studied is a cylindrical waveguide with arbitrary cross section. Cases are possible in which complex spectra are generated, which were indeed observed. This may be due not only to failure to observe the experimental conditions to prevent generation of second harmonics, but also to the generation of other types of waves (for example flexural waves) for which the frequency dependence of excitation threshold may differ significantly. References 15: 9 Russian, 6 Western.
1/1

USSR

UDC 534.286

MAZANIKOV, A. A. and TYUTEKIN, V. V., Acoustics Institute, Academy of Sciences USSR

STUDY OF ACTIVE AUTONOMIC SYSTEMS FOR DAMPING ACOUSTIC FIELDS IN SINGLE-MODE WAVEGUIDES

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 22, No 5, Sep/Oct 76 pp 729-734
manuscript received 4 May 76

[Russian abstract provided by the source]

[Text] A description and results are presented from an experimental study of two autonomic active systems for damping of sound (narrow-band and wide-band), operating under the conditions of single-mode waveguides. Information on the initial field is received by a unidirectional receiver, then fed through an amplifier and phase inverter (for the narrow-band system) and an electronic delay line with an assigned transfer function (for the wide-band system) to unidirectional radiators. The former system operates at individual frequencies in the 7-15 KHz band, the latter in the 1.5-4.5 KHz band. Both systems produce maximum values of sound insulation on the order of 20-30 db in the frequency bands in which they are designed to operate; the initial field remains
1/2

USSR

MAZANIKOV, A. A. and TYUTEKIN, V. V., AKUSTICHESKIY ZHURNAL Vol 22, No 5, Sep/Oct 76 pp 729-734

practically undistorted. The estimate presented shows that the maximum band width of the second system is not more than a decade (about 3 octaves).
References 13: 7 Russian, 6 Western.

2/2

USSR

UDC 534.222

KUDRYASHOV, V. M., Acoustics Institute, Academy of Sciences USSR

GEOMETRIC-WAVE METHOD OF CALCULATION OF ACOUSTIC FIELDS IN A WAVEGUIDE

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 22, No 5, Sep/Oct 76 pp 724-728
manuscript received 3 Nov 75

[Russian abstract provided by the source]

[Text] A study is made of a combined geometric-wave method for calculation of sonic fields in a uniaxial waveguide, in which the sonic field is represented as a superposition of normal waves and geometric rays. The source of sound is a point harmonic source. A program is developed for computer calculation of the sonic field, producing good agreement between results found by the combined method and based on the method of normal waves. The combined method is suitable for any frequency, beginning with a few Hz and provides high calculation speed. References 3 Russian.

1/1

USSR

UDC 532.528

KORTNEV, A. A., MAKAROV, V. K. and SUPRUN, S. G., Odessa Polytechnical Institute

STUDY OF ACOUSTICAL CAVITATION BY THE METHOD OF AMPLITUDE SPECTROMETRY

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 22, No 5, Sep/Oct 76 pp 718-723
manuscript received 20 Apr 76

[Abstract] High reproducibility of results of measurement of the weight loss of miniature metal specimens subjected to cavitation erosion is achieved by monitoring a number of parameters characterizing the cavitation process and holding them at constant levels. A fast method is suggested for estimation of the effectiveness of erosion by acoustical cavitation that is equivalent to measurement of the weight loss of specimens by processing of the amplitude spectra of the cavitation pressure pulses received by a miniature hydrophone. The temperature and gas content of the liquid used were maintained constant by agitating the water in a thermostat for several hours until equilibrium gas content was achieved; pumping of the water through a coil and a second thermostat produced water with the assigned gas content and the assigned temperature. Distilled water was used with gas contents of $0.92 \cdot 10^{-2}$ to $1/2$

USSR

KORTNEV, A. A., MAKAROV, V. K. and SUPRUN, S. G., AKUSTICHESKIY ZHURNAL Vol 22, No 5, Sep/Oct 76 pp 718-723

$1.87 \cdot 10^{-2}$ cm³ gas/cm³ water and temperatures of 10 to 80°C. The weight loss of miniature metal specimens is strongly correlated to the amplitude spectrum of cavitation pulses received by a hydrophone that has the same size and dimensions as the specimens tested and is placed at the same point in the cavitation volume. References 13: 8 Russian, 5 Western.

KANEVSKIY, I. N. and NISNEVICH, M. M., State Design and Planning Scientific Research Institute of the Rare Metals Industry

STRUCTURE OF THE FIELD OF FOCUSING RADIATORS AND ACOUSTIC LENSES

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 22, No 5, Sep/Oct 76 pp 706-710
manuscript received 25 Jul 75

[Russian abstract provided by the source]

[Text] An investigation is made of phase distribution along the acoustic axis and in the focal plane of converging wave fronts. Relations are found for the phase anomaly as a function of the degree of nonuniformity of amplitude on the wave front, and for the cardinal number of half-waves in the side maxima as a function of their ordinal numbers. It is found that the wavelength in the vicinity of the focus increases as compared with that far from the focus, and is a complex function of the apex angle of the wave front, the direction to the focus and the distance from the focus. It is experimentally shown that oblique beams arising due to inhomogeneity of oscillations of the surface of radiators are a decisive factor in distorting the field in the focal region of ultrasonic lenses. References 9: 8 Russian, 1 Western.

1/1

YEVSEYEV, V. N. and KIRPICHNIKOV, V. YU.

INFLUENCE OF WAVE PROPERTIES OF A RIB ON THE RADIATION OF AN INFINITE PLATE EXCITED BY A FORCE PARALLEL TO THE RIB

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 22, No 5, Sep/Oct 76 pp 698-705
manuscript received 8 Apr 75

[Abstract] A study is made of the influence of longitudinal and flexural (heightwise) oscillations of a rib on the radiation of a plate loaded by a force with line of action parallel to the rib. It is shown that in many cases the longitudinal oscillations of the rib may change the radiation of the reinforced plate. Calculation examples are presented, as well as formulas for determination of the influence of the wave properties of the rib on the radiation of the plate. The calculations show that the radiation of sound by a plate excited by a force applied along the line of connection of the rib to the plate is less than for excitation by a force applied to the free edge of the rib. At low frequencies, when the wave properties of the rib appear comparatively weakly, both cases of excitation give approximately the same result. However, at high frequencies, application of the perturbing

1/2

USSR

YEVSEYEV, V. N. and KIRPICHNIKOV, V. YU., AKUSTICHESKIY ZHURNAL Vol 22, No 5, Sep/Oct 76 pp 698-670

force to the plate allows a significant reduction in radiation in comparison to the case when the perturbing force is applied to the free edge of the rib. References 9 Russian.

2/2

USSR

UDC 534.1+534.322.3

VYALYSHEV, A. I. and TARTAKOVSKIY, B. D., Acoustics Institute, Academy of Sciences USSR

COMPENSATING FOR EMISSION OF A FLEXURALLY VIBRATING PLATE ON SUBCRITICAL FREQUENCIES

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 22, No 5, Sep/Oct 76 pp 679-685
manuscript received 21 Jan 76

[Abstract] A study is made of the possibility of decreasing the sound power radiated by a bending-oscillating plate into a medium by applying additional concentrated forces to the surface of the plate. The study is performed for a rectangular plate and for an infinite plate as a function of the coordinate of the additional force and the distance between the points of application of the main and compensating forces. It is shown that the attenuation of the sonic power at subcritical frequencies is a result of the acoustic interaction between equivalent sources at the points of application of force for the infinite plate and the result of change of the input impedances for a plate of finite size. For finite plates, particularly at resonant oscillating frequencies, the primary contribution to radiation is that of $1/2$

USSR

VYALYSHEV, A. I. and TARTAKOVSKIY, B. D., AKUSTICHESKIY ZHURNAL Vol 22, No 5, Sep/Oct 76 pp 679-685

the edges of the plate; therefore, compensation for radiation is proportional to the decrease in amplitude of natural oscillations of the plate. Thus, for the infinite plate there is a change in the radiation impedance of the equivalent sources, for a finite plate -- the input impedances for the applied forces. Both cases may be encountered simultaneously in practice. References 6: 3 Russian, 3 Western.

2/2

USSR

UDC 534.26

VESHEV, V. A., Leningrad State University, Physics Department of Scientific Research Institute for Physics

THE RADIATION OF SOUND BY A SEMI-INFINITE PLATE

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 22, No 5, Sep/Oct 76 pp 666-674
manuscript received 2 Dec 75

[Abstract] A study is made of the bending oscillations of a thin semi-infinite plate immersed in an ideal, compressible fluid. It is assumed that the edge of the plate is either rigidly secured or free. Based on the exact solution by the Wiener-Hopf method, the reflectivity of the bending wave traveling through the plate from its edge is calculated and the radiation pattern is constructed for the sonic field in the liquid. The nature of the radiation in the liquid gradually changes from dipole (with low values of k) to quadrupole radiation. In the case of a free edge of the plate, the quadrupole nature of the radiation begins to appear earlier and is more strongly expressed than in the case of an attached edge.

References 8: 6 Russian, 2 Western.

1/1

USSR

UDC 534.874.2

VASIL'YEV, V. A., Acoustics Institute, Academy of Sciences USSR

DIRECTIONALITY OF VIBRATIONAL VELOCITY RECEIVERS LOCATED NEAR A SCREEN

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 22, No 5, Sep/Oct 76 pp 658-665
manuscript received 4 Feb 76

[Abstract] The screen mentioned in the title is a body which is small in comparison to the wavelength, either absolutely rigid or with an elastic surface impedance. A study is made of the case of rigid attachment of the screen as a unit whole and the case when the screen can oscillate under the influence of the incident wave. It is shown that the directionality characteristic of a vibrational velocity receiver near the screen retains its dipole nature. For the case of a spherical screen, the change in sensitivity of the receiver and rotation of the axis of its dipole directionality characteristic are determined. The sensitivity of the receiver may be changed as a function of the type of screen and placement of the receiver. Reference 1 Russian.

1/1

USSR

UDC 534.222.2

BOTYGINA, N. N., BUKATYY, V. I., and KHMELEVTSOV, S. S., Institute of Atmospheric Optics, Siberian Affiliate, Academy of Sciences USSR

STIMULATED EMISSION OF ACOUSTIC WAVES WHEN A LASER PULSE INTERACTS WITH WATER

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 22, No 5, Sep/Oct 76 pp 652-657
manuscript received 6 Jan 75

[Abstract] The experimental effect of optical excitation of acoustic waves in liquids due to the rapid thermal expansion of the irradiated volume remains practically unstudied. Therefore, this work presents the results of experimental studies of optical excitation of acoustic waves in water when the density of the absorbed optical energy is less than the latent heat of evaporation. A neodymium laser with millisecond pulse duration was used as the light pulse source. The experimental data on pressure are compared with calculated data determined by the formula $P_m \approx 3E_a \beta c / 16\pi \tau R R_0 J_c$, where E_a is the absorbed energy, β is the coefficient of thermal expansion, c is the speed of sound in the liquid, τ is the duration of the radiation pulse, R is the distance from the center of the sphere to the point of observation, R_0

1/2

USSR

BOTYGINA, N. N., BUKATYY, V. I. and KHMELEVTSOV, S. S., ZKUSTICHESKIY
ZHURNAL Vol 22, No 5, Sep/Oct 76 pp 652-657

is the radius of the focal area, c_p is the specific heat capacity and J is the mechanical equivalent of the heat. The calculated and experimental data agree satisfactorily with the experimental parameters used. More intensive thermal generation of acoustic waves in liquids is possible by achieving a transition to the metastable state by heating the volume of liquid to temperatures close to the critical temperature. References 11: 10 Russian, 1 Western.

2/2

USSR

UDC 534.26

ANDREYEVA, I. B. and SAMOVOL'KIN, V. G., Acoustics Institute, Academy of
Sciences USSR

SCATTERING OF SOUND BY ELASTIC CYLINDERS OF FINITE LENGTH

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 22, No 5, Sep/Oct 76 pp 637-638
manuscript received 29 Dec 75

[Russian abstract provided by the source]

[Text] The cross sections of back scattering of sound by elastic cylinders in water are experimentally determined over a broad range of change of length L and radius a . Air and metal cylinders were used as the scattering agents. The value of ka fell between 0.16 and 43, the relative cylinder length L/ρ varied from 0.066 to 35 (where k is the wave number of the sonic wave, ρ is the dimension of the first Fresnel zone). A method is presented for calculation of the back scattering cross section for elastic cylinders with arbitrary L based on the scattering cross section of an unbounded cylinder and the relationship between L and ρ . References 14: 10 Russian, 4 Western.

1/1

USSR

UDC 535.21+621.378.325

BOZHKOVA, A. I., BUNKIN, F. V. and GYRDEV, L. L., The Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR, Moscow

EFFECT OF DISTURBANCE OF A LIQUID SURFACE ON A SONIC FIELD EXCITED IN IT BY LASER RADIATION WITH MODULATED INTENSITY

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 3, No 7[49], Jul 76 pp 1494-1500 manuscript received 17 Nov 75

[Russian abstract provided by the source]

[Text] The authors make a theoretical analysis of the effect of disturbance of a liquid surface on a sonic field, excited in this liquid by intensity-modulated laser radiation. They find the radiation pattern for the averaged sonic pressure. They compute the dispersion of the sonic pressure in the case of gaussian statistics of slopes and arbitrary statistics of movements in the boundary surface of the liquid. They make a qualitative analysis of the results. References 5 Russian.

1/1

USSR

UDC 533.6.01

NI, A. L. and RYZHOV, O. S.

ON SPEEDS OF SOUND IN MULTICOMPONENT CHEMICALLY ACTIVE GAS MIXTURES

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA: MATEMATIKA, MEKHANIKA, ASTRO-NOMIYA in Russian No 3, Jul 76 pp 117-128 manuscript received 18 Dec 75

[Russian abstract provided by the source]

[Text] An approximate system of equations that describes nonlinear propagation of waves in media with an arbitrary number of chemical reactions is reduced to a single partial differential equation with order one unit greater than the number of relaxation processes. This equation introduces the concept of intermediate speeds of sound. The authors determine the order of arrangement of these intermediate values between the frozen and equilibrium speeds of sound. An examination is made of certain special cases where some relaxation processes are nearly frozen while others take place in such a way as to cause extremely slight deviation of the system from a state of thermodynamic equilibrium. References 10: 7 Russian, 1 Polish, 2 Western.

1/1

USSR

KLUDZIN, V. V., KULAKOV, S. V. and RAZZHIVIN, B. P., Leningrad Institute of Aircraft Instrument Making

COLLINEAR DIFFRACTION OF LIGHT BY TRANSVERSE ACOUSTIC WAVES

Leningrad FIZIKA TVERDOGO TELA in Russian Vol 18, No 9, Sep 76 pp 2827-2830
manuscript received 3 May 76

[Abstract] An outline is given of the theory of collinear interaction of light with ultrasonic waves (collinear diffraction), and an expression is derived for the effective photoelastic constant that determines collinear interaction for the case of acoustic shear waves in lithium niobate. The authors give the results of experimental studies of collinear diffraction using an LG-36 laser emitting on $0.6328 \mu\text{m}$, an FEU-16 photomultiplier and standard rf oscillators. With an increase in oscillator frequency relative to the acoustic wave where collinear diffraction occurs, a contour corresponding to the Schaeffer-Bergman diffraction pattern is observed in the plane perpendicular to the direction of optico-acoustic interaction. The amplitude-frequency response is given for a collinear interaction system based on a CaWO_4 crystal. This device has a storage factor $Q = 1000$.
References 7: 5 Russian, 2 Western.

1/1

USSR

SEMENOV, V. I., SAPOZHNIKOV, V. K., AVDIYENKO, K. I. and SHELOPUT, D. V.,
Institute of Physics of Semiconductors, Academy of Sciences USSR, Novosibirsk

OPTICO-ACOUSTIC PROPERTIES OF A KRS-6 SINGLE CRYSTAL

Leningrad FIZIKA TVERDOGO TELA in Russian Vol 19, No 9, Sep 76 pp 2805-2807
manuscript received 26 Apr 76

[Abstract] A study is done on the optico-acoustic properties of a Soviet industrial crystal of thallium bromide-chloride (KRS-6) containing 70% chloride and 30% bromide by mass. Specimens of two types -- with orientations of [100], [010], [001] and [111], [112], [110] were cut from a single block. Transmission was at least 40% for $\lambda = 0.6328 \mu\text{m}$. Tables are given summarizing the results of experimental determination of the speed of ultrasonic waves and optico-acoustic storage factor as well as the calculated elastic and photoelastic constants of the crystals. Attenuation of ultrasonic waves from 50 to 220 MHz was studied at room temperature by an optical probing method. It was found that attenuation is a quadratic function of frequency. The KRS-6 crystals have comparatively high optico-acoustic storage factors for both longitudinal and transverse waves, and can be used for various optico-acoustic devices operating in the 30-150 MHz range.
References 3: 2 Russian, 1 Western.

1/1

USSR

UDC 534-13;534-143;551.596

GOL'DMAN, R. S., NIKOLAYEV, V. V. and TITOV, M. S.

DIAGNOSIS AND CLASSIFICATION OF MARINE OBJECTS USING THE THEORY OF TESTS. II

Novosibirsk TRUDY SHESTOY VSESOYUZNOY SHKOLY-SEMINARA PO STATISTICHESKOY GIDROAKUSTIKE [Transactions of the Sixth All-Union Seminar School on Statistical Hydroacoustics] in Russian, 1975 pp 366-371

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Zh898 by A. Zuyevich]

[Text] In studying hydroacoustic information to select informative characteristics in problems of diagnosis and classification of marine objects a measure of importance of characteristics may be used that is defined by a logic method based on using the theory of tests. The essence of this method is briefly described. The problem of defining the stability of informative characteristics is examined. It is shown that the stability of the characteristics can be logically evaluated by using the measure of importance. From part I (RZh-Fiz, 1975, 7Zh902) we know that dead-end tests can be used in control recognition of marine objects from their echo signals. An algorithm of voting by dead-end tests is described that is applicable to solution of the

1/2

USSR

GOL'DMAN, R. S., NIKOLAYEV, V. V. and TITOV, M. S., TRUDY SHESTOY VSESOYUZNOY SHKOLY-SEMINARA PO STATISTICHESKOY GIDROAKUSTIKE, 1975 pp 366-371

recognition problem. An experiment in control recognition was done on the "Minsk-22" computer using a set of specially developed programs. Control recognition was carried out on two classes with different formulations of the goal of the diagnostic problem (toward greater precision). In the first case the objects were classified as biological or nonbiological. In the second case the objects were categorized as marine animals (whales) moving in different directions. Control recognition showed dependence of results on proper selection of thresholds of differentiability. Selection to minimize errors and failures gave the three best sets of differentiability thresholds. When recognition was done with the use of these thresholds, voting was 100% correct in the first case. In the second case the number of correct responses was 85%, failures 10%, and 5% of the objects were improperly identified. The results show the effectiveness of the proposed algorithm in solving individual problems of diagnosis of marine objects.

2/2

USSR

UDC 534-13;534-143;551.596

LBOV, G. S. and KOTYUKOV, V. I.

A SEQUENTIAL RECOGNITION PROCEDURE IN HYDROACOUSTIC RESEARCH

Novosibirsk TRUDY SHESTOY VSESOYUZNOY SHKOLY-SEMINARA PO STATISTICHESKOY GIDROAKUSTIKE [Transactions of the Sixth All-Union Seminar School on Statistical Hydroacoustics] in Russian, 1975 pp 361-365

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Zh897 by I. G. Ioffe]

[Text] In studying the information characteristics of hydroacoustic signals the problem arises of finding the optimum algorithm for recognition by automatic detection and classification systems. As a rule the measurement procedures examined do not take account of the statistical mutual relation between characteristics. For complex problems of hydroacoustic classification of investigated objects it is shown that it is advisable to use hierarchical recognition systems that minimize the cost of measurements of the characteristics of an object for a given classification reliability. A description is given of a computerizable algorithm of sequential measurement that accounts for the dependence of characteristics, and as a result reduces the

1/2

USSR

LBOV, G. S. and KOTYUKOV, V. I., TRUDY SHESTOY VSESOYUZNOY SHKOLY-SEMINARA PO STATISTICHESKOY GIDROAKUSTIKE, 1975 pp 361-365

cost of measurements in the recognition process. In this algorithm it is assumed that the costs of measuring each characteristic are equal, repeated measurement does not carry additional information, the a priori probability and parameters of the probability density function of the characteristics are known for each class. The measurement algorithm is determined in the following procedure. The vector of conditional mathematical expectations of the values of the corresponding characteristics is found in the entire space of characteristics for each class. The expected a posteriori probabilities of the classes are determined. The criterion F for stopping the procedure is calculated for all vectors, and the unknown value of the mathematical expectation of F is calculated for a given characteristic. The algorithm is realized in the form of a program for the "Minsk-22" computer.

2/2

USSR

UDC 534-13;534-143;551.596

BELOUSOV, A. A. and BELOUS, V. V.

INTENSITY OF MULTIPLE BOTTOM REVERBERATION

Novosibirsk TRUDY SHESTOY VSESOYUZNOY SHKOLY-SEMINARA PO STATISTICHESKOY GIDROAKUSTIKE [Transactions of the Sixth All-Union Seminar School on Statistical Hydroacoustics] in Russian, 1975 pp 185-189

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Zh884 by A. Zuyevich]

[Text] In a number of instances, as in marine geophysical research, multiple bottom reverberation may reach appreciable levels. An examination is made of the mechanism of formation of multiple bottom reverberation in the deep sea, assuming superimposed coordinates of emitter and receiver. Expressions are derived for calculating the intensity of bottom reverberation of any multiplicity at arbitrary times.

1/1

USSR

UDC 534-13;534-143;551.596

KUDRYAVTSEV, O. P. and OL'SHEVSKIY, V. V.

ENERGY CHARACTERISTICS OF BOTTOM REVERBERATION WITH CONSIDERATION OF THE INFLUENCE OF REFLECTIVE BOUNDARIES

Novosibirsk TRUDY SHESTOY VSESOYUZNOY SHKOLY-SEMINARA PO STATISTICHESKOY GIDROAKUSTIKE [Transactions of the Sixth All-Union Seminar School on Statistical Hydroacoustics] in Russian, 1975 pp 179-184

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Zh871 by I. G. Ioffe]

[Text] The paper presents calculations of the average intensity of bottom reverberation with consideration of reflections from boundaries. The calculation is based on using a discrete phenomenological model involving a technique proposed in the authors' previous paper (see Abstract No 7Zh870). It is assumed that in multibeam bottom reverberation the ground reflects and scatters acoustic waveforms, while the surface of the water is reflective only. A geometric interpretation is given of the arrangement of the scattering surfaces. Scattering takes place from concentric annular surfaces formed by intersection of ellipsoids of revolution with the ground plane. Calculated values are given for the anomaly and vertical angular distributions of bottom reverberation for totally uncorrelated and totally correlated scattered signals arriving from the same scattering region.

1/1

USSR

UDC 534-13;534-143;551.596

NOVIKOV, A. K.

CLASSIFICATION OF ACOUSTIC NOISES IN ACCORDANCE WITH THEIR PROBABILISTIC REPRESENTATIONS

Novosibirsk TRUDY SHESTOY VSESOYUZNOY SHKOLY-SEMINARA PO STATISTICHESKOY GIDROAKUSTIKE [Transactions of the Sixth All-Union Seminar School on Statistical Hydroacoustics] in Russian, 1975 pp 190-196

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Zh872 by A. N. R.]

[Text] An examination is made of problems of classifying noises based on processing a set of realizations of measurement results. It is shown that existing methods of noise classification as a random process are actually determined not only by the objective properties of noise, but also by the technique used for synthesizing the set of realizations in processing the measurement results. Processing a set of randomly chosen realizations does not give information on the steady-state nature of the random process. To get this information it is necessary to use a set of realizations chosen in an appropriate way. An examination is made of a number of examples of analysis of nonstationary random processes where the use of a set of randomly

1/2

USSR

NOVIKOV, A. K., TRUDY SHESTOY VSESOYUZNOY SHKOLY-SEMINARA PO STATISTICHESKOY GIDROAKUSTIKE, 1975 pp 190-196

selected realizations leads to classification of the processes as steady-state with gaussian distribution, while use of an appropriately chosen set of realizations results in classification of the processes as unsteady with gaussian distribution.

2/2

USSR

UDC 534-13;534-143;551.596

KUDRYASHOV, V. M.

ACOUSTIC FIELDS IN A WAVEGUIDE WITH A STATISTICALLY UNEVEN SURFACE. PART II

Novosibirsk TRUDY SHESTOY VSESOYUZNOY SHKOLY-SEMINARA PO STATISTICHESKOY GIDROAKUSTIKE [Transactions of the Sixth All-Union Seminar School on Statistical Hydroacoustics] in Russian, 1975 pp 154-168

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Zh881 by V. K.]

[Text] The author examines the most typical methods of calculating the first two moments of the sound field for the case of the high end of the audio band in the geometric acoustics approximation in a waveguide with statistically uneven surfaces. A general representation of the sound field is given within the framework of this approximation. A detailed analysis is done on previous research relating to calculations of the statistical averages of the field and its intensity. Computational schemes are examined; corresponding formulas are presented for estimating the average intensity and space-time correlation functions of the integral field. An examination is made of previously developed programs that solve the problem of multiple scattering of sound by the uneven surface of a waveguide; results are compared for

1/2

USSR

KUDRYASHOV, V. M., TRUDY SHESTOY VSESOYUZNOY SHKOLY-SEMINARA PO STATISTICHESKOY GIDROAKUSTIKE, 1975 pp 154-168

calculation of the field by a program using a combined method in which the sound field is described by a set of normal waves and rays, and by a program based solely on the summation of normal waves. An estimate is made of a sound field with modulated emission; correlation characteristics of the sound field emitted by a noise-like source are analyzed. For part I see RZh-Fiz, 1975, 7M874.

2/2

USSR

UDC 534-13;534-143;551.596

TARASENKO, F. P.

ON THE POSSIBILITIES OF USING NONPARAMETRIC STATISTICAL METHODS IN HYDRO-ACOUSTICS

Novosibirsk TRUDY SHESTOY VSESOYUZNOY SHKOLY-SEMINARA PO STATISTICHESKOY GIDROAKUSTIKE [Transactions of the Sixth All-Union School Seminar on Statistical Hydroacoustics] in Russian, 1975 pp 346-347

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Zh896 by I. G. Ioffe]

[Text] In modern statistical hydrolocation one often encounters the need for synthesizing signal processing techniques that meet requirements as to accuracy of decisions made and permissible error probabilities. Using the results of synthesis of procedures found in radar is not possible due to the discrepancies between received radar and hydrolocation signals. This is because of the great difference between the velocities of electromagnetic and sound waves, the high level and unsteady nature of acoustic interference, the complex acoustic inhomogeneity of the medium and the presence of reverberations. For this reason the traditional path in statistical synthesis of

1/2

USSR

TARASENKO, F. P., TRUDY SHESTOY VSESOYUZNOY SHKOLY-SEMINARA PO STATISTICHESKOY GIDROAKUSTIKE, 1975 pp 346-347

procedures consists in developing models of hydrolocation signals and finding the required distributions by theoretical or experimental means. However this method is complicated and does not always give the required results. An examination is made of the feasibility of using nonparametric methods that enable a direct transition to synthesis of procedures without knowledge of the functional form of the distributions and with little a priori information. Nonparametric procedures are somewhat less effective than parametric in the case of correct parametric information, but are considerably more effective when the assumed distribution differs from the true form.

2/2

USSR

UDC 534-13;534-143;551.596

KUDRYAVTSEV, O. P. and OL'SHEVSKIY, V. V.

ENERGY CHARACTERISTICS OF OCEAN REVERBERATION FROM A SCATTERING LAYER WITH
CONSIDERATION OF THE INFLUENCE OF REFLECTIVE BOUNDARIES

Novosibirsk TRUDY SHESTOY VSESOYUZNOY SHKOLY-SEMINARA PO STATISTICHESKOY
GIDROAKUSTIKE [Transactions of the Sixth All-Union Seminar School on Statis-
tical Hydroacoustics] in Russian, 1975 pp 169-178

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Zh870 by
A. Zuyevich]

[Text] Relations are found for the average intensity of reverberations due
to scattering by inhomogeneities distributed in a layer with consideration of
the influence of two reflective boundaries. Calculation of reverberation
intensity is based on the method of virtual sources. An examination is made
of reverberation anomaly defined as the ratio of the average reverberation
intensity in the medium with multibeam propagation (due to reflections from
the boundaries) to the reverberation intensity observed in an infinite
medium. A computer is used to evaluate reverberation anomalies for cases
of correlated and uncorrelated pairs of scattered signals for different

1/2

USSR

KUDRYAVTSEV, O. P. and OL'SHEVSKIY, V. V., TRUDY SHESTOY VSESOYUZNOY SHKOLY-
SEMINARA PO STATISTICHESKOY GIDROAKUSTIKE, 1975 pp 169-178

combinations of reflectances from the boundaries. It is shown that accounting
for the influence of the reflective boundaries leads to an increase in levels
of reverberation; the reverberation anomaly increases with increasing reflec-
tance from the boundaries. An examination is made of vertical angular dis-
tributions of reverberation anomalies that characterize the distributions of
reverberation intensity at reception points with respect to angles of arrival.
It is shown that the vertical angular distributions of reverberation anomalies
are localized with increasing distance in narrower sectors of angles in the
neighborhood of the direction corresponding to the angle of arrival of the
direct beam. The given model can describe reverberation in shallows when
sound waves are scattered by air bubbles in the surface layer, by scatterers
of biological origin and in certain other cases.

2/2

USSR

UDC 534-13;534-143;551.596

DOLYA, V. K., KOGAN, S. L. and KRAMAROV, YU. A.

ON THE PROBLEM OF DEVELOPING A HYDROPHONE THAT CAN BE CALIBRATED UNDER WORKING CONDITIONS

Rostov-na-Donu ISSLEDOVANIYA PO RADIOFIZIKE [Radiophysics Research, Collection of Works] in Russian, Rostov University, 1975 pp 91-96 (manuscript deposited in VINITI 19 Apr 76 No 1344-76 Dep.)

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Zh889 DEP by the authors]

[Text] The paper describes the design of a hydrophone that can be absolutely calibrated in situ without the use of auxiliary acoustic equipment. In construction the hydrophone is made from two coaxial piezoceramic cylinders held between rigid cover plates. The space between the cylinders is filled with oil. The method of calibrating the hydrophones is described. Experimental results are presented.

1/1

USSR

UDC 534-13;534-143;551.596

IL'YOV, A. YA. and SHAROMOV, I. P.

DETERMINATION OF REFLECTANCE FROM GEOLOGICAL SAMPLES OF MARINE BOTTOM SEDIMENTS

[TRUDY] SAKHALINSKOGO KOMPLEKSNOGO NAUCHNO-ISSLEDOVATEL'SKOGO INSTITUTA DAL'NEVOSTOCHNOGO NAUCHNOGO TSENTRA AKADEMII NAUK SSSR [(Transactions) of the Sakhalin Scientific Research Institute for Comprehensive Studies of the Far Eastern Science Center of the Soviet Academy of Sciences] in Russian No 34, 1975 pp 91-93

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Zh886 by the authors]

[Text] The paper gives the results of measurements of the coefficient of reflection from geological samples, and compares these data with measurements by the acoustic method. Good agreement is observed for an even bottom section. Reflectances are given from research by other authors for similar soil types.

1/1

USSR

UDC 534-13;534-143;551.596

SHAROMOV, I. P.

EXPERIMENTAL DETERMINATION OF REFLECTANCE FROM THE OCEAN BOTTOM

[TRUDY] SAKHALINSKOGO KOMPLEKSNOGO NAUCHNO-ISSLEDOVATEL'SKOGO INSTITUTA DAL'NEVOSTOCHNOGO NAUCHNOGO TSENTRA AKADEMII NAUK SSSR [(Transactions) of the Sakhalin Scientific Research Institute for Comprehensive Studies of the Far Eastern Science Center of the Soviet Academy of Sciences] in Russian No 34, 1975 pp 81-90

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Zh885 by the author]

[Text] A survey devoted to analysis of factors that influence the coefficient of reflection and to description of methods for experimental determination of [reflectance] as a function of the glancing angle. References 21.

1/1

USSR

UDC 534-13;534-143;551.596

APANASENKO, V. A.

CONCERNING THE QUESTION OF SOUND PROPAGATION IN THE VICINITY OF FRONTAL ZONES

[TRUDY] SAKHALINSKOGO KOMPLEKSNOGO NAUCHNO-ISSLEDOVATEL'SKOGO INSTITUTA DAL'NEVOSTOCHNOGO NAUCHNOGO TSENTRA AKADEMII NAUK SSSR [(Transactions) of the Sakhalin Scientific Research Institute for Comprehensive Studies of the Far Eastern Science Center of the Soviet Academy of Sciences] in Russian No 34, 1975 pp 53-55

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Zh882 by the author]

[Text] The paper gives an example of the influence that changes in the properties of an underwater sound channel have on the structure of an acoustic field in the vicinity of a frontal region. It is shown that comparatively small horizontal gradients may cause secondary bottom reflections of an acoustic signal.

1/1

USSR

UDC 534-13;534-143;551.596

BARKHATOV, A. N.

CONCERNING THE CHANGE IN THE MAXIMUM ANOMALY OF SOUND PROPAGATION IN AN UNDERWATER CHANNEL

Gor'kiy OB IZMENENII MAKSIMAL'NOY ANOMALII RASPROSTRANENIYA ZVUKA V PODVODNOM KANALE in Russian, Gor'kiy University, 1976, 6 pp (manuscript deposited in VINITI 9 Apr 76, No 1113-76 Dep.)

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Zh883 by the author]

[Text] The acoustic field in an underwater sound channel is measured under model conditions in the pulse mode. Acoustic pulses of square shape were used with duration of 50 μ s and high-frequency cycle from 115 to 2750 kHz. The results of the measurements were used to calculate the maximum anomaly of sound propagation in dB. It was found that the maximum anomaly of sound propagation in a surface channel increases with range as $r^{1/3}$, where r is the distance to the emitter, in the short-range zone where signal broadening does not exceed the intrinsic pulse duration. The maximum anomaly decreases in the more remote region. In a channel with submerged axis the maximum

1/2

USSR

BARKHATOV, A. N., OB IZMENENII MAKSIMAL'NOY ANOMALII RASPROSTRANENIYA ZVUKA V PODVODNOM KANALE, Gor'kiy University, 1976, 6 pp

anomaly of sound propagation increases on the average with increasing range. The experimental results are interpreted in terms of the geometric theory of multibeam propagation of pulses in a channel.

2/2

USSR

UDC 534-13;534-143;551.596

NAPOL'SKIY, D. I. and KONSTANTINOV, F. I.

EXPERIMENTAL STUDY OF THE CHARACTERISTICS OF SPATIAL INHOMOGENEITIES IN DISTRIBUTION OF THE SPEED OF SOUND

[TRUDY] SAKHALINSKOGO KOMPLEKSNOGO NAUCHNO-ISSLEDOVATEL'SKOGO INSTITUTA DAL'NEVOSTOCHNOGO NAUCHNOGO TSENTRA AKADEMII NAUK SSSR [(Transactions) of the Sakhalin Scientific Research Institute for Comprehensive Studies of the Far Eastern Science Center of the Soviet Academy of Sciences] in Russian No 34, 1975 pp 63-65

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Zh876 by the authors]

[Text] A report on an experimental study of the characteristics of spatial inhomogeneities in the field of the speed of sound. The research was done with a submersible cyclic instrument for measuring the speed of sound. A block diagram is given describing operation of the instrument and the monitoring and recording equipment. The calculated instrumental error was ± 0.015 m/s when a minimum amount of nonstandard equipment was used. To evaluate the space scale of inhomogeneities in the distribution of the

1/2

USSR

NAPOL'SKIY, D. I. and KONSTANTINOV, F. I., [TRUDY] SAKHALINSKOGO KOMPLEKSNOGO NAUCHNO-ISSLEDOVATEL'SKOGO INSTITUTA DAL'NEVOSTOCHNOGO NAUCHNOGO TSENTRA AKADEMII NAUK SSSR, No 34, 1975 pp 63-65

speed of sound the paper presents the calculated values of the mean square amplitude of fluctuations of the random process found in processing the results of measurements made in the Pacific in the vicinity of the Kuril Islands in August-September 1967.

2/2

USSR

UDC 534-13;534-143;551.596

NEFEDOV, L. M. and KLYCHNIKOV, V. A.

FLUCTUATIONS IN A PULSE SIGNAL PROPAGATING IN THE OCEAN

[TRUDY] SAKHALINSKOGO KOMPLEKSNOGO NAUCHNO-ISSLEDOVATEL'SKOGO INSTITUTA DAL'NEVOSTOCHNOGO NAUCHNOGO TSENTRA AKADEMII NAUK SSSR [(Transactions) of the Sakhalin Scientific Research Institute for Comprehensive Studies of the Far Eastern Science Center of the Soviet Academy of Sciences] in Russian No 34, 1975 pp 56-62

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Zh875 by the authors]

[Text] An examination is made of the question of fluctuations in the acoustic energy of pulse signals over various distances. As a result of an experiment it is shown that the main contribution to the field of fluctuations in sound pressure at short distances from the radiator is from the agitated surface of the sea, while at long distances the field of fluctuations is determined chiefly by inhomogeneities of the medium. References 11.

1/1

USSR

UDC 534-13;534-143;551.596

NEFEDOV, L. M.

CONCERNING INHOMOGENEITIES IN THE OCEAN THAT INFLUENCE PROPAGATION OF SOUND

[TRUDY] SAKHALINSKOGO KOMPLEKSNOGO NAUCHNO-ISSLEDOVATEL'SKOGO INSTITUTA DAL'NEVOSTOCHNOGO NAUCHNOGO TSENTRA AKADEMII NAUK SSSR [(Transactions) of the Sakhalin Scientific Research Institute for Comprehensive Studies of the Far Eastern Science Center of the Soviet Academy of Sciences] in Russian, No 34, 1975 pp 44-52

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Zh874 by the author]

[Text] A survey of experimental data on the parameters of random inhomogeneities of temperature and speed of sound in the ocean in the range of scales that are significant for scattering of acoustic waves. References 40.

1/1

USSR

VINOGRADOV, A. A. and ORNATSKAYA, Z. I.

HALL EFFECT IN OXYGENOUS VANADIUM BRONZES OF SILVER AND SODIUM

Saratov FIZIKA POLUPROVDNIKOV I POLUPROVDN'KOVAYA ELEKTRONIKA [Physics of Semiconductors and Semiconductor Electronics, Collection of Works] in Russian, Saratov University, 1975 pp 116-120

[From REFERATIVNYY ZHURNAL, FIZIKA No 6(II) 1976 Abstract No 6Ye1171 by the authors]

[Text] The authors measured Hall constants (R_x) on single crystals of a series of compositions representing the alpha and beta phases of vanadium bronzes of silver and sodium. For bronzes of the alpha phase the values of R_x were 1.51-1.77 cm³/coul at 20°C and dropped with growth in temperature in the range from -145 to +90°C. For bronzes of the beta phase R_x was about 10⁻³ cm³/coul and did not vary in the temperature range of 20-170°C. They computed the mobilities, concentrations and several other parameters with consideration of previously obtained electrical characteristics.

1/1

USSR

KARRYEV, N. A. and GARYAGDYEV, G.

TEMPERATURE DEPENDENCE OF THE ELECTRICAL CONDUCTIVITY OF HEAVILY DOPED AND COMPENSATED InAs CRYSTAL

Ashkhabad FIZIKO-TEKHNICHESKIYE ISSLEDOVANIYA VESHCHESTVA [Physico-Technical Investigation of Matter, Collection of Works] in Russian 1975 pp 60-63

[From REFERATIVNYY ZHURNAL, FIZIKA No 6(II) 1976 Abstract No 6Ye1147 by Yu. Ya. Tkach]

[Text] The authors measured the temperature dependence of the electrical conductivity (σ) in the range of 1.5 to 300 K for samples of InAs with a degree of compensation which varies from 0.8 to 0.99. The total concentration of impurities was about 10¹⁷ cm⁻³. In $\sigma(T)$ it is possible to segregate the segment with a constant energy of activation ϵ_a 30-70 meV in the temperature range from 300 to 70 K and the segment 50-2 K with a decreasing energy of activation upon reduction in temperature. The conductivity in the low-temperature region agrees with Mott law. The authors note that the quantity ϵ_a corresponds to the computations of the amplitude of the mean square fluctuation in potential.

1/1

USSR

SANDULOVA, A. V., SYDIR, B. I., YEKIMOV, YU. S. and MARTYNOV, YU. I.

INVESTIGATIONS OF THE INFLUENCE OF HYDROSTATIC PRESSURE ON THE ELECTRICAL CONDUCTIVITY OF FILAMENTARY CRYSTALS OF GALLIUM ANTIMONIDE

Voronezh NITEVIDNYYE KRISTALLY I TONKIYE PLENKI. CH I [Filamentary Crystals and Thin Films. Part I, Collection of Works] in Russian 1975 pp 357-360

[From REFERATIVNYY ZHURNAL, FIZIKA No 6(II) 1976 Abstract No 6Yel152 by A. Zh.]

[Text] Whisker crystals, grown by the gas transport method, had a resistivity of 0.02-0.08 ohm·cm. In the pressure range from $P = 0$ to 1000 kgf/cm² (at room temperature) the dependence of the relative change in resistance in the crystal on P is linear. The sensitivity (α) of the samples to pressure is $(18-21) \cdot 10^{-5} \text{ atm}^{-1}$ and decreases monotonically with temperature in the temperature range of $\pm 60^\circ\text{C}$. The temperature coefficient of α does not exceed 0.4% deg⁻¹.

1/1

USSR

GUK, G. N., USOL'TSEVA, N. YA. and SHADRIN, V. S.

PIEZORESISTANCE OF CUBIC SILICON CARBIDE

Novosibirsk FIZIKA I TEKHNIKA POLUPROVODNIKOV [Physics and Technology of Semiconductors, Collection of Works] in Russian 1975 pp 11-19

[From REFERATIVNYY ZHURNAL, FIZIKA No 6(II) 1976 Abstract No 6Yel153 by the authors]

[Text] The authors investigate the piezoresistance of cubic silicon carbide (β -SiC) of n-type under hydrostatic pressure in the temperature range of 20-400°C and pressures up to 8 kbar. The obtained data on the relative change in resistivity under the influence of pressure for β -SiC are compared with the results for the hexagonal polytype SiC-6H.

1/1

USSR

DROZHZHIN, A. I., KAPUSTIN, YU. A., SEDYKH, N. K., KARELIN, B. V. and
DUNAYEV, A. I.

MAGNETIC RESISTANCE IN ELASTICALLY DEFORMED CRYSTALS OF p-TYPE SILICON

Voronezh NITEVIDNYYE KRISTALLY I TONKIYE PLENKI. CH I [Filamentary Crystals
and Thin Films. Part I, Collection of Works] in Russian 1975 pp 368-372

[From REFERATIVNYY ZHURNAL, FIZIKA No 6(II) 1976 Abstract No 6Yel163 by
Yu. M. Gal'perin]

[Text] The authors experimentally investigated the piezomagnetic resistance of silicon whiskers grown from the gas phase and oriented with axis of growth [111]. The crystals were doped in the process of growth with Au, Pt and B and had p-type conductivity with resistivity $\rho = 0.03 \text{ ohm}\cdot\text{cm}$. The magnetic resistance was investigated both under tension and under compression with a deformation up to $2.4 \cdot 10^{-3}$ in magnetic fields $B \leq 18 \text{ kGs}$; the resistance was determined from the current-voltage characteristics which were linear all the way up to current densities of 600 A/cm^2 . The authors showed that under compression ρ was increased with growth in B; under tension ρ first dropped, then began to grow. Here the depth of the minimum was increased with growth $1/2$

USSR

DROZHZHIN, A. I., KAPUSTIN, YU. A., SEDYKH, N. K., KARELIN, B. V., and
DUNAYEV, A. I., NITEVIDNYYE KRISTALLY I TONKIYE PLENKI. CH I 1975 pp 368-372

in tension. The authors give evaluations of the influence of the magnetic field on the accuracy of measuring the deformations by sensing elements of strain gauges.

USSR

SANDULOVA, A. V., NOVIKOV, A. A., DUGAYEV, V. K. and DOLGOV, YE. L.

MAGNETORESISTIVE PROPERTIES OF FILAMENTARY CRYSTALS OF SILICON-GERMANIUM SOLID SOLUTIONS ON A GERMANIUM BASE AND THE POSSIBILITY OF USING THEM AS MAGNETORESISTORS

Voronezh NITEVIDNYYE KRISTALLY I TONKIYE PLENKI. CH I [Filamentary Crystals and Thin Films. Part I, Collection of Works] in Russian 1975 pp 341-344

[From REFERATIVNYY ZHURNAL, FIZIKA No 6(II) 1976 Abstract No 6Ye1164 by A. Zh.]

[Text] Whiskers of Si-Ge solid solutions were grown in the system Si-Ge-Br and doped with Pt. The crystals were oriented in the direction [111] and had the faceting of a regular hexahedron. The resistivity ρ of the samples was 0.5-0.02 ohm·cm with concentrations of electrons of $(5-20) \cdot 10^{15} \text{ cm}^{-3}$. The relative changes in the magnetic resistance $\Delta\rho_H/\rho_0$ in the magnetic field H depend on the amount of Si. With increase in Si the slope of the curves for $\Delta\rho_H/\rho_0$ vs H is diminished. At 4 at% Si $\Delta\rho_H/\rho_0 \approx 0.21$, and at 9 at% $\Delta\rho_H/\rho_0 \approx 0.105$. Magnetic sensing elements on the base of these solid solutions may function in the temperature range up to 150-200°C.
1/2

USSR

SANDULOVA, A. V., NOVIKOV, A. A., DUGAYEV, V. K. and DOLGOV, YE. L.,
NITEVIDNYYE KRISTALLY I TONKIYE PLENKI. CH I 1975 pp 341-344

The working range of temperatures is significantly worse in sensors based on Ge and InSb.

USSR

SANDULOVA, A. V., RYBAK, YE. M., GONCHAROV, V. P. and OKHRIMENKO, YU. A.

INVESTIGATION OF THE PROCESS OF GROWTH AND DOPING OF GALLIUM ANTIMONIDE WHISKERS

Voronezh NITEVIDNYYE KRISTALLY I TONKIYE PLENKI. CH I [Filamentary Crystals and Thin Films. Part I, Collection of Works] in Russian 1975 pp 149-154

[From REFERATIVNYY ZHURNAL, FIZIKA No 6(II) 1976 Abstract No 6Yell66 by Ye. Z.]

[Text] The authors made a theoretical and experimental study of the composition of the gas and condensed phases of the system GaSb in the temperature range of 300-1200 K. They produced filamentary crystals of GaSb with a length up to 3 cm and a diameter of 10-500 μm with a direction of growth of [111]. In the process of growing the single crystals they were doped with zinc and tellurium. The authors determined the dependence of the concentration of carriers n in the filamentary crystals and their specific electrical conductivity σ on Te concentration. They found that with $C_{\text{Te}} \sim 1 \cdot 10^{18} \text{ at} \cdot \text{cm}^{-3}$ in the gas phase the n-type conductivity
1/2

USSR

SANDULOVA, A. V., RYBAK, YE. M., GONCHAROV, V. P. and OKHRIMENKO, YU. A., NITEVIDNYYE KRISTALLY I TONKIYE PLENKI. CH I 1975 pp 149-154

changes to p-type. With change in type of conductivity σ is minimal (about $1 \text{ ohm}^{-1} \cdot \text{cm}^{-1}$). The maximum value of $\sigma \sim 40 \text{ ohm}^{-1} \cdot \text{cm}^{-1}$ is observed with $C_{\text{Te}} = 1 \cdot 10^{17} \text{ at} \cdot \text{cm}^{-3}$. They investigated the dependence of n and σ on Zn concentration introduced into the gas phase. They determined the temperature dependences of σ , the Hall constant and the thermal emf in the range of 1000-450 K. At large concentrations of Te and Zn the Hall constant and σ of the samples depend weakly on temperature. The authors observed a decrease in the coefficient of strain sensitivity and the coefficient of hydrostatic pressure with growth in n .

2/2

USSR

BAGRAYEV, N. T., VLASENKO, L. S. and ZHITNIKOV, R. A., Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR

OPTICAL ORIENTATION OF Si^{29} NUCLEI IN *n*-SILICON, AND THE WAY THAT THIS ORIENTATION DEPENDS ON THE INTENSITY OF THE PUMPING LIGHT

Moscow ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI in Russian Vol 71, No 3(9), Sep 76 pp 952-959 manuscript received 23 Feb 76

[Abstract] The method of nuclear magnetic resonance is used to study optical orientation of Si^{29} nuclei in *n*-type silicon doped with phosphorus ($N_d \approx 1.7 \cdot 10^{13} \text{ cm}^{-3}$). The single-crystal specimen was exposed to unpolarized light from an incandescent lamp (1 kW) in a magnetic field of 0.49 T at 77 K, the incident light being perpendicular to the magnetic field. Experimental relations were found for the way that the degree of polarization and spin-lattice relaxation time of Si^{29} nuclei depend on the concentration of photostimulated electrons. It was found that the main contribution to relaxation of nuclei comes from electrons captured by the donor centers, even when the number of conduction electrons is much greater than the number of localized electrons. This shows that the effectiveness of relaxation of the nuclei on localized electrons is at least two orders of magnitude higher than that of their relaxation on

1/2

USSR

BAGRAYEV, N. T., VLASENKO, L. S. and ZHITNIKOV, R. A., ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI Vol 71, No 3(9), Sep 76 pp 952-959

conduction electrons. This conclusion is confirmed by the absence of polarization of Si^{29} nuclei in *p*-type boron-doped silicon that does not contain phosphorus. It is found that the reduction in spin-lattice relaxation time for these nuclei is limited with increasing concentration of photostimulated electrons. This limitation is shown to be due to saturation filling of donor centers with electrons. It is established that the limiting degree of dynamic polarization of Si^{29} nuclei depends on the intensity of the pumping light. It is theoretically and experimentally shown that the limiting degree of nuclear polarization is determined by polarization of spins of the aggregate of photostimulated and thermal electrons in the conduction band. References 15: 6 Russian, 9 Western.

2/2

USSR

UDC 621.382.2

DEMCHENKO, A. M. and LEBEDEV, A. A., Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR, Leningrad

ELECTRIC PROPERTIES OF p-i-n LEDs BASED ON GALLIUM PHOSPHIDE

Leningrad FIZIKA I TEKHNICA POLUPROVODNIKOV in Russian Vol 10, No 10, Oct 76 pp 1826-1829 manuscript received 27 Jan 76

[Russian abstract provided by the source]

[Text] The paper gives the results of a study of the static current-voltage curves of p-i-n diodes in which the i-layer is doped with Fe while the p-region is doped with oxygen and zinc. A detailed analysis is made of these curves in the low-current region, and the resistivity of the i-layer is estimated to be of the order of $10^6 \Omega \cdot \text{cm}$. The lifetime of the minority current carriers is of the order of $(1-5) \cdot 10^{-10}$ s. It is found that the switching voltage of the diodes is strongly dependent on the thickness of the i-layer. It is shown that an S-shaped current-voltage characteristic is observed in the 77-420 K range. The residual voltage after switching is 2-3.5 V and depends weakly on temperature. The switching voltage is 3-35 V and decreases slightly with increasing temperature. The thickness of the

1/2

USSR

DEMCHENKO, A. M. and LEBEDEV, A. A., FIZIKA I TEKHNICA POLUPROVODNIKOV, Vol 10, No 10, Oct 76 pp 1826-1829

i-layer is 4-10 μm . The diode emits red light with a quantum yield of 0.05-1%. References 15: 8 Russian, 7 Western.

2/2

USSR

UDC 621.315.592

KACHURIN, G. A., NIDAYEV, YE. V., KHODYACHIKH, A. V. and KOVALEVA, L. A.,
Institute of Physics of Semiconductors, Siberian Department, Academy of
Sciences USSR, Novosibirsk

ANNEALING OF IMPLANTED LAYERS BY A SCANNING LASER BEAM

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 10, No 10, Oct 76
pp 1890-1893 manuscript received 17 May 76

[Russian abstract provided by the source]

[Text] It is shown that implanted layers of silicon and gallium arsenide can be annealed under room conditions by a focused scanning argon laser beam. The threshold powers are determined that are necessary for electrical activation of arsenic and zinc introduced into silicon and into gallium arsenide respectively. An investigation is made of the electrophysical properties of the annealed layers and the depth distribution of free carriers. In contrast to thermal annealing, laser annealing does not lead to displacement of the implanted arsenic atoms in silicon. In gallium arsenide, laser annealing promotes fixation of the implanted zinc in the region of the mean free path of ions. It is proposed that some additional heating should be used to lessen the thermal shock of laser annealing. References 9: 4 Russian, 5 Western.
1/1

USSR

UDC 621.315.592

AYVAZOV, A. A., GLAZOV, V. M., PAVLOVA, L. M. and REGEL', A. R., Moscow Institute of Electronic Technology, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR, Leningrad

EVALUATION OF THE POSITIONAL COMPONENT OF THE ENTROPY OF FUSION OF SEMI-CONDUCTOR COMPOUNDS WITH CONSIDERATION OF THEIR DISSOCIATION AT THE MELTING POINT

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 10, No 10, Oct 76
pp 1939-1944 manuscript received 7 Jun 76

[Russian abstract provided by the source]

[Text] An examination is made of the process of melting of semiconductor compounds of equiatomic composition. The basic structural elements of the melt are determined. Computational expressions are proposed for estimating the positional component of the entropy of fusion within the framework of the chosen approximation. Consideration is taken of possible dissociation of the compound at the melting point in the approximation of the theory of regular solutions or on the basis of experimental data. The positional component of the entropy of fusion is calculated for a group of semiconductor compounds of the $A^{III}B^V$ and $A^{IV}B^{VI}$ types. References 16: 14 Russian, 2 Western.
1/1

USSR

UDC 621.315.592

GRINBERG, A. A., Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR, Leningrad

PHOTOIONIZATION OF DEEP IMPURITY CENTERS IN SEMICONDUCTORS

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 10, No 10, Oct 76 pp 1872-1878 manuscript received 29 Apr 76

[Abstract] Based on a model of an impurity center that is described by the Coulomb potential ($Z \geq 0$) and the attracting δ -potential, the authors calculate the cross section of photoionization σ on the basis of exact wave functions for the ground state and states of the continuous spectrum. Computer calculations are given for the frequency dependences $\sigma(\omega)$ for centers of different depths. The threshold value of σ is found for non-negative Z with greater than 1% accuracy. Beyond the ionization threshold, analytical expressions are found for σ when $Z \geq 0$ and $Z \leq 0$ that are approximations describing the cross section with an accuracy of at least 20%. References 13: 6 Russian, 7 Western.

1/1

USSR

UDC 621.315.592

POKLONSKIY, N. A., STEL'MAKH, V. F. and TKACHEV, V. D., Associate Member of the Academy of Sciences BSSR, Belorussian State University imeni V. I. Lenin

ON A PHENOMENOLOGICAL THEORY OF JUMP CONDUCTIVITY IN SEMICONDUCTORS

Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 20, No 9, Sep 76 pp 783-785 manuscript received 18 Nov 76 [sic]

[Abstract] A phenomenological expression is found for the steady-state density of jump current in semiconductors with multiply charged point defects. The method of solution is based on qualitative similarity of electron motion by jumps between defects to motion of quasiparticles of a solid. In jump conductivity the frequency of electron jumps between two defects is analogous to the frequency of jumps of atomic particles migrating in the crystal, and the role of thermal velocity of quasiparticles is played by the thermal velocity of the corresponding motion of electrons over defects. It is shown that the jump current has a drift component due to the motion of individual electrons over defects in an electric field; this component is characterized chiefly by the direction of the jumps. A diffusion component arises due to defect concentration gradients in different charge states that appear with application of an external electric field to the crystal. References 6: 3 Russian, 3 Western.

1/1

USSR

BASS, F. G. and BAKANAS, R. K., Institute of Physics of Semiconductors,
Academy of Sciences Latvian SSR, Vil'nyus

PARTICULARS OF CYCLOTRON-PHONON ABSORPTION IN SEMICONDUCTOR FILMS

Leningrad FIZIKA TVERDOGO TELA in Russian Vol 18, No 9, Sep 76 pp 2672-2675
manuscript received 22 Apr 76

[Russian abstract provided by the source]

[Text] An examination is made of the cyclotron-phonon coefficient of absorption in a thin semiconductor plate placed in an external magnetic field directed perpendicularly to the plate surface. It is found that absorption behaves resonantly regardless of the polarization of the electromagnetic wave, and the absorption peaks are considerably narrowed as compared with those in the bulk material. It is shown that the presence of the magnetic field imparts resonant behavior to dimensional-phonon resonance as well. Moreover, an additional series of absorption lines is observed that are not present in either ordinary cyclotron-phonon resonance or in dimensional-phonon resonance. References 7: 5 Russian, 2 Western.

1/1

USSR

ASHKINADZE, B. M. and FISHMAN, I. M., Physicotechnical Institute imeni
A. F. Ioffe, Academy of Sciences USSR

LIQUID ELECTRON-HOLE DROPS AND DEVELOPMENT OF A DENSE PLASMA IN GERMANIUM
WITH A HIGH LEVEL OF OPTICAL EXCITATION

Moscow PIS'MA V ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI in Russian
Vol 24, No 6, 20 Sep 76 pp 342-345 manuscript received 21 Jul 76

[Russian abstract provided by the source]

[Text] Under a high level of excitation of germanium, regions of dense electron-hole plasma appear, and fast kinetics of the drop in recombination emission of electron-hole drops develops. These results are attributed to the effects of spreading of the liquid drops when a certain threshold value of the level of excitation is reached where the kinetic energy of rapidly moving drops is sufficient to tear the drop apart in an inelastic collision, producing a dense plasmoid. References 9: 5 Russian, 4 Western.

1/1

USSR

POKAZAN'YEVA, G. K., SAMOKHVALOV, A. A., DEMCHUK, K. M. and RODIONOV, K. P.,
Institute of Physics of Metals, Academy of Sciences USSR, Sverdlovsk

INFLUENCE THAT HYDROSTATIC PRESSURE UP TO 20 kbar HAS ON ELECTRICAL CONDUCTIVITY OF THE FERROMAGNETIC SEMICONDUCTOR $\text{Eu}_{0.98}\text{Sm}_{0.02}\text{O}$

Leningrad FIZIKA TVERDOGO TELA in Russian Vol 19, No 9, Sep 76 pp 2786-2788
manuscript received 12 Apr 76

[Abstract] The substitution of Sm^{2+} and Yb^{2+} ions for europium in EuX monochalcogenides ($\text{X} = \text{O}, \text{S}, \text{Se}$) raises the Curie point T_c without impairing semiconductor properties. While solid solutions of $\text{Eu}_{1-x}\text{Sm}_x\text{O}$ have an increased T_c , it is hard to determine the nature of conductivity because of the uncontrollable content of oxygen vacancies. This paper shows on the basis of a solid solution of $\text{Eu}_{0.98}\text{Sm}_{0.02}\text{O}$ that studies of electrical conductivity of compounds of this kind under conditions of hydrostatic pressure enable one to distinguish effects associated with the presence of samarium ions from those due to oxygen vacancies, and to determine the nature of conductivity more precisely. The electrical conductivity of the single-crystal specimen was studied as a function of temperature and hydrostatic pressure. The sign of the Hall emf and thermo-emf corresponded to n-type conductivity.

1/2

USSR

POKAZAN'YEVA, G. K., SAMOKHVALOV, A. A., DEMCHUK, K. M. and RODIONOV, K. P.,
FIZIKA TVERDOGO TELA, Vol 19, No 9, Sep 76 pp 2786-2788

The concentration of current carriers at room temperature was $\approx 10^{18} \text{ cm}^{-3}$, and carrier mobility was $\approx 10 \text{ cm}^2/\text{V}\cdot\text{s}$. The ferromagnetic Curie point determined from the temperature dependence of the initial permeability is spread out over 80-120 K, which is considerably higher than for EuO for which $T_c \approx 70 \text{ K}$. It was found that hydrostatic pressure up to 20 kbar at room temperature increases conductivity by more than an order of magnitude. Analysis of the results shows that the samarium ions form deeper donor levels than the levels of oxygen vacancies. It can be assumed that as the concentration of oxygen vacancies decreases, solid solutions of $\text{Eu}_{1-x}\text{Sm}_x\text{O}$ will have a more pronounced nature of semiconductor conductivity. References 6: 2 Russian, 4 Western.

2/2

USSR

KASTAL'SKIY, A. A. and SEMERDZHYAN, B. O., Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR, Leningrad

SEMICONDUCTOR FLUORESCENCE INDUCED BY HEATING OF CURRENT CARRIERS

Leningrad FIZIKA TVERDOGO TELA in Russian Vol 18, No 9, Sep 76 pp 2611-2613
manuscript received 13 Apr 76

[Russian abstract provided by the source]

[Text] The authors have observed and investigated fluorescence close to the edge of the valence band arising under the action of a microwave field pulse in semiconductors of GaAs, InP and Si. The effect is induced by a reduction in the rate of nonradiative recombination as current carriers are heated, and by the resultant accumulation of free electrons and holes. Analysis of the experimental data gives the temperature of electrons, their dependence on the electric field, and also the dependence of nonradiative capture on electron temperature. References 7: 1 Russian, 6 Western.

1/1

USSR

UDC 537.226

ITSKOVICH, M., KONSIN, P. and KRISTOFEL', N., Institute of Physics, Academy of Sciences Estonian SSR

INFLUENCE OF IMPURITY CARRIERS ON THE FERROELECTRIC PROPERTIES OF NARROW-GAP SEMICONDUCTORS

Tallin IZVESTIYA AKADEMII NAUK ESTONSKOY SSR, FIZIKA, MATEMATIKA in Russian Vol 25, No 3, 1976 pp 269-273 manuscript received 18 Dec 75

[Russian abstract provided by the source]

[Text] The methods of vibronic theory are used to study the influence that additional carriers of impurity origin have on the ferroelectric properties of narrow-gap semiconductors. Illustrative computer calculations are done. Impurity carriers may induce a considerable shift in the Curie point and alter the shape of temperature curves for low-symmetry lattice distortion and the frequency of the soft mode in the ferroelectric phase. References 12: 5 Russian, 7 Western.

1/1

VOLKOV, A. S. and TSARENKOV, G. V., Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR, Leningrad

IMPEDANCE OF A VARIBAND p-n-p STRUCTURE

Leningrad FIZIKA I TEKHNICA POLUPROVODNIKOV in Russian Vol 10, No 9, Sep 76
pp 1705-1711 manuscript received 5 Jan 76

[Russian abstract provided by the source]

[Text] A theoretical study is done on the impedance of a variband p-n-p structure in the weak injection mode in the frequency region below the inverse time of space charge relaxation in the n-region.

Schockley has previously considered a homoband p-n-p structure from the standpoint of the feasibility of achieving negative resistance that might show up on frequencies comparable with the inverse time of transit of injected holes across the n-region where an electric field is set up by nonhomogeneous doping. However, the electric fields actually created in this way are insufficient for the drift of the injected carriers to predominate over diffusion, which prevents realization of a negative storage factor Q less than 10 in absolute value in a homoband structure.

1/2

USSR

VOLKOV, A. S. and TSARENKOV, G. V., FIZIKA I TEKHNICA POLUPROVODNIKOV, Vol 10, No 9, Sep 76 pp 1705-1711

In the variband p-n-p structure the ratio between diffusion and drift can easily be changed in favor of drift since the drift in such a structure is due to the electric field, which is determined in the case of uniform doping of the n-region by the gradient of width of the forbidden band in this region, and can be made adequately high in practice. It is shown that if the injection conductivity of a forward-biased p-n junction is greater than its capacitive conductivity, the storage factor of a variband structure could be close to the value $Q = -1$. References 11: 4 Russian, 7 Western.

2/2

BOLOTOV, V. V., VASIL'YEV, A. V. and SMIRNOV, L. S., Institute of Physics of Semiconductors, Siberian Department, Academy of Sciences USSR, Novosibirsk

DEFECT FORMATION IN SILICON AT HIGH IRRADIATION TEMPERATURES

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 10, No 9, Sep 76
pp 1670-1674 manuscript received 1 Mar 76

[Russian abstract provided by the source]

[Text] An investigation is made of changes in the concentration of charge carriers (n,p) and lifetime of nonequilibrium charge carriers (τ) in n-type and p-type silicon with 1.7 MeV electron bombardment in the temperature range of 20-600°C and subsequent annealing up to ~600°C. It is shown that the temperature of bombardment has an appreciable effect on the rate of introduction of defect centers and on the nature of subsequent annealing. Silicon of p-conductivity irradiated at 600°C shows a change in mobility, an increase in the percentage of stable defects with rising temperature of bombardment and a number of other effects. An analogy is drawn with the behavior of germanium, and the results are interpreted with consideration of known complexes of defects. References 23: 10 Russian, 13 Western.

1/1

SHIK, A. YA., Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR

CARRIER STATISTICS AND THERMAL RELAXATIONS IN NONHOMOGENEOUS SEMICONDUCTORS

Moscow ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI in Russian Vol 71, No 3(9), Sep 76 pp 1159-1165 manuscript received 22 Mar 76

[Russian abstract provided by the source]

[Text] An examination is made of the statistics of electrons in a nonhomogeneous semiconductor in which the energy bands are modulated by a random gaussian potential. It is assumed that the semiconductor has a single type of partly compensated donor levels. A study is made of the position of the chemical potential level, the degeneracy criterion, and particulars of the way that free carrier concentration and conduction depend on temperature. An examination is also made of the kinetics of establishment of steady-state conduction with an abrupt change in the temperature of a specimen. It is shown that this process in a nonhomogeneous weakly compensated semiconductor is characterized by anomalously large relaxation times that are activation-dependent on temperature. References 14: 10 Russian, 4 Western.

1/1

BELOVA, I. M., Moscow State University imeni M. V. Lomonosov

ON THE THEORY OF THE TUNNEL EFFECT IN SCHOTTKY BARRIERS WITH CONSIDERATION OF THE RANDOM FIELD IN A SEMICONDUCTOR

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 10, No 9, Sep 76
pp 1643-1646 manuscript received 8 Dec 75

[Russian abstract provided by the source]

[Text] An examination is made of the tunnel effect in a metal-semiconductor system with consideration of the random field in the semiconductor. The resistance of the tunnel contact is numerically calculated as a function of the applied voltage for *n*-Ge. It is shown that accounting for the random field appreciably improves the agreement between theory and experiment in the region of maximum resistance. A relation is also found for the tunnel conductivity as a function of dopant concentration in a semiconductor in the absence of external voltage. References 6: 1 Russian, 5 Western.

1/1

YAKUBOVICH, O. V., SIMONOV, M. A., BELOKONEVA, YE. L., YEGOROV-TISMENKO, YU. K. and BELOV, N. V., academician, Moscow State University imeni M. V. Lomonosov

CRYSTAL STRUCTURE OF Ca,Mg-DIORTHOTRIBORATE(PYROBORATE) OF KURCHATOVITE
 $\text{CaMg}[\text{B}_2\text{O}_5]$

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 230, No 4, 1 Oct 76
pp 837-840 manuscript received 28 May 76

[Abstract] The paper gives the results of spectral and x-ray structural analysis of kurchatovite. These results show that the structural elements of natural and synthetic kurchatovite are the same: walls of Mg-octahedra parallel to plane (100) are similar to the walls of iron octahedra in pyrite. The magnesium walls in direction *a* alternate with walls of Ca-polyhedra. Walls of the second type are formed by pairs of Ca-polyhedra connected via common edges with pseudocenters in the middle, and are joined into a two-dimensional ligature via common vertices. Ditriorthoborate groups $[\text{B}_2\text{O}_5]^{4-}$ that have common edges with the Ca-polyhedra interconnect the Mg-octahedra located on one level in the *c* direction both in a wall and from neighboring walls, making a rigid frame. It is shown that this structure leads to a rhombic cell with high pseudosymmetry. References 6: 4 Russian, 2 Western.

1/1

IMENKOV, A. N., Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR, Leningrad, and SENTPALI, BELA, Institute of Theoretical Physics, Hungarian Academy of Sciences, Budapest

BARRIER CAPACITANCE OF A GRADED $\text{Ga}_{1-x}\text{Al}_x\text{As}<\text{Si}>$ p - n JUNCTION

Leningrad FIZIKA I TEKHNIKA POLUPROVODNIKOV in Russian Vol 10, No 9, Sep 76 pp 1620-1626 manuscript received 4 Nov 75

[Russian abstract provided by the source]

[Text] An investigation was made of variband $\text{Ga}_{1-x}\text{Al}_x\text{As}<\text{Si}>$ p - n structures grown on n -GaAs substrates by the liquid epitaxy method with cooling. The donor-acceptor junction was graded. The concentration of Si atoms in the junction was $(1-2) \cdot 10^{18} \text{ cm}^{-3}$, which was sufficient for "tails" of allowed bands to show up near the valence band.

A stepwise reduction of the charge of ionized centers is observed in the space charge layer with a temperature reduction in the 190-210 K region, and also at temperatures of 170-200 K in the process of stress relaxation with an abrupt increase in the width of the space charge layer at a fixed temperature. This is apparently a result of a phase transition and shows

1/2

USSR

IMENKOV, A. N., SENTPALI, BELA, FIZIKA I TEKHNIKA POLUPROVODNIKOV, Vol 10, No 9, Sep 76 pp 1620-1626

that the impurity centers in the space charge layer may be in a two-phase state in the presence of the "tails" of the bands.

It is found that the "tails" of the bands have a strong effect on the barrier capacitance of the p - n junction when the capacitance is independent of time and frequency at temperatures above 210 K. This is a consequence of the fact that the impurity centers in the space charge layer are not completely ionized, and as a result the concentration of ionized centers N_p on the p -boundary of the space charge layer in the case of fixed width becomes dependent on temperature. It is found that in the investigated structures $N_p \sim \exp(E_p/kT)$, where $E_p = 13-14 \text{ meV}$ and kT is a quantum of thermal energy.

It is shown that the method of capacitance-voltage characteristics is applicable to determination of the concentration profile in a graded p - n junction in the presence of "tails" of the bands if capacitance is independent of frequency and time. References 8: 5 Russian, 3 Western.

2/2

USSR

DOROZHUKIN, L. M., KIZEL', V. A., SHIGORIN, V. D. and SHIPULO, G. P., Moscow Physicotechnical Institute, Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR

DISPERSION OF QUADRATIC OPTICAL SUSCEPTIBILITY OF CRYSTALS OF LITHIUM NIOBATE AND SODIUM-BARIUM NIOBATE

Moscow PIS'MA V ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI in Russian Vol 24, No 26, 20 Sep 76 pp 363-366 manuscript received 18 Aug 76

[Abstract] Quadratic optical susceptibility of ferroelectrics has not been adequately studied with regard to frequency dispersion close to electronic absorption bands. The authors study dispersion of several components of the tensor of quadratic susceptibility χ in crystals of lithium niobate LiNbO_3 and sodium-barium niobate $\text{Ba}_2\text{NaNb}_5\text{O}_{15}$ in the visible and near-ultraviolet regions of the spectrum. The results are interpreted from the standpoint of dispersion of the effective nonlinear polarizability of Nb-O bonds. It is shown that accounting for crystal structure and the dependence of polarizability of Nb-O bonds on length explains observed experimental particulars of dispersion of the components of the tensor of quadratic optical susceptibility of these ferroelectrics close to electronic absorption bands. References 8: 1 Russian, 7 Western.

1/1

USSR

ANDRYUSHIN, YE. A., Physics Institute imeni P. N. Lebedev, Academy of Sciences of the USSR, Moscow

GROUND STATE ENERGY OF A LAMINAR ELECTRON-HOLE LIQUID

Leningrad FIZIKA TVERDOGO TELA in Russian Vol 18, No 9, Sep 76 pp 2493-2498 manuscript received 15 Mar 76

[Abstract] The ground state energy of a laminar electron-hole liquid is calculated on the basis of the following model. Two parallel planes are separated by a distance c , holes moving on one of the planes, and electrons on the other. Transitions between planes are forbidden, the particle density for the planes is identical and equal to n . The law of dispersion of electrons and holes is:

$$E_e(\mathbf{p}) = \frac{p^2}{2m_e}; \quad E_h(\mathbf{p}) = \frac{p^2}{2m_h}$$

where \mathbf{p} is two-dimensional momentum and m_e, m_h are the effective masses. It is shown that the state of a metallic electron-hole liquid is energetically more advantageous than that of an exciton gas. As the electron/hole mass ratio approaches zero, there is a smooth transition to a state with ordered heavy particles. References 9: 6 Russian, 3 Western.

1/1

USSR

UDC 537.226;537.311.322

OSINTSEVA, L. A., GRIDIN, V. A. and ALEKSEYEV, V. V.

INVESTIGATION OF MOBILITY IN DIFFUSION LAYERS OF n-TYPE SILICON

Novosibirsk FIZIKA I TEKHNIKA POLUPROVODNIKOV [Physics and Technology of Semiconductors, Collection of Works] in Russian, 1975 pp 62-70

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Ye1031 by the authors]

[Text] An investigation is made of the temperature and concentration dependence of mobility in heavily doped diffusion layers of n-Si. Theoretical estimates are made of the temperature dependence of mobility in order to determine the mechanism of scattering of charge carriers.

1/1

USSR

UDC 537.226;537.311.322

SHADRIN, V. S.

THE STRAIN-GAGE RESISTANCE EFFECT IN n-TYPE GALLIUM ANTIMONIDE

Novosibirsk FIZIKA I TEKHNIKA POLUPROVODNIKOV [Physics and Technology of Semiconductors, Collection of Works] in Russian, 1976 pp 3-9

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Ye1021 by the author]

[Text] An investigation is made of piezoresistance of n-GaSb. Variation in Fermi energy and resistivity is calculated in the nonlinear-strain approximation. It is shown that piezoresistance of semiconductors where the conduction band has two types of minima located close to one another may increase with rising temperature. Experimental data are given that confirm the conclusions of the theory.

1/1

USSR

UDC 537.226;537.311.322

SHADRIN, V. S., SHABALINA, T. V. and RAGULIN, V. V.

INVESTIGATION OF THE STRAIN-GAGE RESISTANCE PROPERTIES OF n-TYPE Si AND Ge
IN THE HIGH-DEFORMATION AND LOW-TEMPERATURE REGION

Novosibirsk FIZIKA I TEKHNIKA POLUPROVODNIKOV [Physics and Technology of
Semiconductors, Collection of Works] in Russian, 1976 pp 10-17

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Ye1020 by the
authors]

[Text] A saturation of the strain-gage effect takes place in the region of
high deformations and low temperatures. In accordance with experimental
data, temperature dependences are found for the anisotropy of effective
masses and the shear component of the deformation potential. Anomalous
behavior of the curves is noted in the region of nitrogen temperatures.

1/1

USSR

UDC 621.365.91

AZARKEVICH, YE. I., VOYTENKO, A. YE., ISAKOV, V. P. and KOTOV, YU. A.,
Scientific Research Institute of High Voltages at Tomsk Polytechnic
Institute imeni S. M. Kirov, Tomsk

EXPLOSIVE-TYPE ELECTRIC GENERATOR

Leningrad ZHURNAL TEKHNIЧЕСКОY FIZIKI in Russian Vol 46, No 9, Sep 76
pp 1957-1962 manuscript received 10 Feb 75

[Russian abstract provided by the source]

[Text] The authors describe an experimental model of an explosive-type electric generator that uses the energy of an explosion to produce electric pulses across an active load. The device contains an explosive magnetic generator, a high-speed breaker, an explosive chamber, and other elements. A current of 140 kA with a voltage of 100 kV and pulse duration of about 0.5 microsecond was obtained across a resistance load. Figures 3; references 21: 14 Russian, 7 Western.

1/1

USSR

UDC 537.521

ZAKHAROV, V. V., KARPIKOV, A. A. and CHEKHUNOV, YE. V.

VOLUMETRIC GAS DISCHARGE IN NITROGEN WITH STEADY-STATE EXTERNAL IONIZATION

Leningrad ZHURNAL TEKHNIЧЕСКОY FIZIKI in Russian Vol 46, No 9, Sep 76
pp 1846-1856 manuscript received 31 Mar 75

[Russian abstract provided by the source]

[Text] By numerical solution of the Townsend and Poisson equations the authors determine the current-voltage characteristics of a discharge as a function of the strength of the external ionization source and gas pressure. They investigate the structure of the electric field in the vicinity of the cathode. They give the dependence of the cathode drop on the coefficient of secondary emission and voltage across the electrodes. They investigate the time development of the discharge before reaching the steady state. They obtain an agreement of the computations for the non-stationary equations with the computations made by the stationary method. References 18: 10 Russian, 8 Western.

1/1

GRYAZNOV, O. S. and TAMARCHENKO, V. I., Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR, Leningrad

INELASTIC INTERBAND SCATTERING BY PHONONS IN TRANSPORT PHENOMENA

Leningrad FIZIKA I TEKHNICA POLUPROVODNIKOV in Russian Vol 10, No 9, Sep 76
pp 1664-1669 manuscript received 20 Feb 76

[Russian abstract provided by the source]

[Text] An investigation is made of the influence that interband electron-phonon collisions have on transfer coefficients in heavily doped semiconductors and multivalent metals with consideration of inelasticity of scattering processes. It is shown that inelasticity appreciably changes the magnitude and concentration dependence of kinetic coefficients due to interband scattering effects. The manifestation of inelasticity is very noticeable not only in thermoelectric and thermomagnetic effects, but also in the Lorentz number and even the Hall constant. The analysis is done for different values of the parameters of the electron spectrum and constants of electron-phonon interaction. References 10: 8 Russian, 2 Western.

1/1

USSR

GLUSHKOV, M. V., ITSKEVICH, YE. S., KOSICHKIN, YU. V., NADEZHDINSKIY, A. I., TOLMACHEV, A. N. and SHIROKOV, A. M., Institute of High-Pressure Physics, Academy of Sciences USSR, Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR

MAGNETIC INVERSION OF THE HALL EFFECT IN TELLURIUM

Moscow ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI in Russian Vol 71, No 3(9), Sep 76 pp 1239-1245 manuscript received 20 Mar 76

[Russian abstract provided by the source]

[Text] A change in sign of the Hall coefficient with an increase in the magnetic field is observed in the mixed conduction region in tellurium. An investigation is made of the influence that temperature and hydrostatic pressure up to 10 kbar have on the Hall coefficient, magnetoresistance and resistivity. It is shown that the inversion field and the magnetoresistance corresponding to this field in combination with resistivity and the Hall coefficient in weak fields enable one to determine the concentration and mobility of electrons and holes, as well as the change in these parameters with temperature and pressure. References 8: 2 Russian, 6 Western.

1/1

USSR

UDC 532.135.534.22

AVANESOV, A. M. and AVETISYAN, I. A., Sukhumi Affiliate, Acoustics Institute, Academy of Sciences USSR

INFLUENCE OF POLYMER ADDITIVES ON THE PROPAGATION OF SOUNDWAVES IN WATER CONTAINING BUBBLES

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 22, No 5, Sep/Oct 76 pp 633-636
manuscript received 8 Oct 75

[Abstract] Certain results of earlier works studying the theoretical and experimental results of propagation of slight perturbations in a mixture of a newtonian fluid with gas bubbles are extended to the case when the liquid containing the bubbles is a viscoelastic liquid with relaxation. Models of a mixture of newtonian liquids with bubbles are generalized to cover the case when the liquid phase is viscoelastic. The dispersion relationships produced for the velocity and attenuation factor of the soundwave are numerically studied. The results produced indicate that polymer additives might have a significant influence on the velocity and attenuation factor of soundwaves in a gas-liquid mixture, the polymers increasing the maximum velocity and decreasing the maximum attenuation of $1/2$

USSR

AVANESOV, A. M. and AVETISYAN, I. A., AKUSTICHESKIY ZHURNAL Vol 22, No 5, Sep/Oct 76 pp 633-636

the soundwave. These maxima are reached at lower values of frequency than in a newtonian fluid. This is explained by the decrease in the natural pulsation frequency of a bubble following addition of polymers to the water. References 18: 16 Russian, 2 Western.

USSR

UDC 532.517.4:532.529.5

GORODTSOV, V. A., Institute of Mechanics Problems, Academy of Sciences USSR, Moscow

TURBULENT FLOW OF A POLYMER SOLUTION AROUND A FLAT PLATE

Minsk INZHENERNO-FIZICHESKIY ZHURNAL in Russian Vol 31, No 3, Sep 76
pp 486-492 manuscript received 26 Jun 75

[Abstract] The simplest method of calculation of the turbulent boundary layer of a plate in a viscous liquid is the Prandtl-Karman method, based on the assumption of local dependence of mean velocity on dynamic velocity and thickness of the boundary layer and agreement of the distribution of velocity near the plate and the walls of a pipe. This method has been extended to description of the boundary layer of polymer solutions. In this work, simple resistance formulas are produced by the use of a small parameter. These logarithmic resistance formulas are used to estimate the accuracy of certain simplifications and eliminate errors encountered in the literature. The mode of maximum reduction of resistance is analyzed. References 12: 5 Russian, 7 Western.

1/1

USSR

UDC 532.529

STOLYAROV, A. A.

THE EFFECT OF ENERGY SEPARATION IN A TWO-PHASE STREAM

Minsk INZHENERNO-FIZICHESKIY ZHURNAL in Russian Vol 31, No 3, Sep 76
pp 474-479 manuscript received 24 Jun 75

[Abstract] Theoretical and experimental results are presented relating to the study of a new and basically different effect of energy separation in two-phase initially homogeneous, media moving at high velocities, consisting in that after deceleration and separation, the temperature of the two phases is found to be significantly different. The physical essence of the phenomenon is as follows: in an adiabatic stream of an ideal gas, the relationship between the absolute stagnation temperature and static temperature is given by the heat content equation, which indicates that the higher the flow velocity, the lower the temperature in the stream. Significant cooling of the gas occurs primarily at supersonic velocities and as the maximum velocity is achieved, the value of temperature approaches zero. For subsonic velocities, the cooling of

1/2

USSR

STOLYAROV, A. A., INZHENERNO-FIZICHESKIY ZHURNAL Vol 31, No 3,
Sep 76 pp 474-479

the gas in the stream is less significant, although it does still occur. If liquid or solid particles are then introduced to the gas which has been cooled, for example by adiabatic expansion in a Laval nozzle, due to the presence of internal degrees of freedom in the two-phase medium and particularly due to the possibility of exchange of thermal and mechanical energy between the particles and the gas, either the particles will be cooled and the gas will be heated or vice versa, depending on the relationship of temperatures of the two phases. If then rather rapid deceleration and separation of the two-phase stream into individual phases is achieved, it will be found that the temperatures of the two phases are not the same at all. In the general case, the stagnation temperature of the gas after separation is higher, equal or lower than the initial temperature, while the temperature of the particles approaches the minimum temperature achieved at the end of the process of expansion by the gas.

2/2

USSR

UDC 532.529.5

BORODULYA, V. A., BUYEVICH, YU. A. and ZAV'YALOV, V. V., Institute of Heat and Mass Transfer, Minsk; Institute of Problems of Mechanics, Moscow

STABLE OPERATION OF APPARATUS WITH GRANULAR LAYERS FLUIDIZED BY A GAS STREAM

Minsk INZHENERNO-FIZICHESKIY ZHURNAL in Russian Vol 31, No 3, Sep 76
pp 410-417 manuscript received 13 Nov 75

[Abstract] The stability of the process of fluidization is studied, analyzing the granular bed as a single, structureless element with a certain operating characteristic and studying the boundary of the area of stability in the space of parameters of the process. The schematic model studied consists of a layer of granular particles resting upon a screen with gas pressure evenly fed from below the screen; the primary parameter used to judge the nature of the process of fluidization is the instantaneous layer height. The layer is considered macroscopically homogeneous if its density averaged through the cross section of the apparatus depends only on the instantaneous value of layer height (that is on time), not on the position of the cross section in the layer. One shortcoming of the model is that the mean gas speed in the bubble phase is considered independent of the degree of expansion of the layer and, consequently, of time. It is shown that when the boundary

1/2

USSR

BORODULYA, V. A., BUYEVICH, YU. A., and ZAV'YALOV, V. V., INZHENERNO-FIZICHESKIY ZHURNAL Vol 31, No 3, Sep 76 pp 410-417

of the region of stability is crossed in the space of parameters of the process, the stability of the steady fluidization regime is disrupted in a so-called "mild" way, i.e. the amplitude of oscillations rises monotonically from zero as the mapping point advances into the region of instability in the direction away from its boundary. In this case an orderly periodic oscillatory state is established that is analogous in concept to secondary currents in hydrodynamics, and corresponds to near-harmonic oscillations of the bed. With increasing supercriticality, the amplitude of pulsations in the height of the bed may exceed the limiting value, and after a certain elapsed time may again return to a stationary state, after which the process repeats itself. This regime corresponds to relaxation self-oscillations. References 17 Western.

2/2

USSR

UDC 532.517.4

NOVOZHILOV, V. V.

ONE-LAYER THEORY OF STEADY-STATE TURBULENT FLOWS OF AN INCOMPRESSIBLE FLUID, AND APPLICATION OF THIS THEORY TO CALCULATION OF EQUILIBRIUM TURBULENT BOUNDARY LAYERS

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA: MATEMATIKA, MEKHANIKA, ASTRONOMIYA in Russian No 3, Jul 76 pp 129-145 manuscript received 13 Feb 76

[Russian abstract provided by the source]

[Text] A Reynolds stress formula is proposed for closure of Reynolds equations that is a generalization of the Kármán relation and permits disregarding the thickness of the viscous sublayer (thus allowing a stress jump at the wall). Two empirical constants appearing in this formula are determined from the problem of flow in a tube. When applied to calculation of an equilibrium turbulent boundary layer, the theory generalizes the Faulkner-Scan equation for laminar boundary layers. This gives the theoretical explanation of the interval experimentally observed by F. Clauser where the solution of the problem is two-valued. The equation gives the correct representation of the values of m and H for the pre-separation layer.

1/2

USSR

NOVOZHILOV, V. V., VESTNIK LENINGRADSKOGO UNIVERSITETA: MATEMATIKA, MEKHANIKA, ASTRONOMIYA, No 3, Jul 76 pp 129-145

At the end of the paper, calculations of three equilibrium boundary layers (id. 1400, id. 2500 and id. 2600) are presented and compared with experiments. References 11: 3 Russian, 8 Western.

2/2

USSR

UDC 532.526.5:533.6.011.5

ANDREYEV, G. N., GLAGOLEV, A. I., ZUBKOV, A. I., LYAGUSHIN, B. YE. and MINOSTSEV, V. B., Institute of Mechanics, Moscow State University imeni M. V. Lomonosov

ON THE STRUCTURE OF FLOW CLOSE TO THE LATERAL SURFACE, AND FORMATION OF ZONES OF SEPARATION ON BODIES OF SEGMENTAL-CONICAL SHAPE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 230, No 3, 21 Sep 76
pp 541-544 manuscript received 21 Apr 76

[Abstract] Boundary layer theory shows that the structure of a hypersonic flow of perfect gas at high Reynolds numbers on the forward surface of segmental-conical bodies follows stream lines on the outer surface of the boundary layer that deviate only slightly from the corresponding limiting stream lines on the surface of the body. The flow pattern differs drastically on the lateral surface where transversal pressure gradients that arise in nonaxisymmetric flow result in lines of runoff and zones of separation. This paper gives the results of experimental and theoretical studies of the stream lines on lateral surfaces of segmental-conical bodies for different angles of attack. References 4 Russian.

1/1

USSR

UDC 533.6.001

GAVIN, L. B., LUN'KIN, YU. P. and MYMRIN, V. F., Institute of Engineering Physics, Academy of Sciences USSR

FLOW OF VISCOUS TWO-TEMPERATURE NONEQUILIBRIUM IONIZED RADIATING GAS AROUND BLUNTED BODIES

Minsk INZHENERNO-FIZICHESKIY ZHURNAL in Russian Vol 31, No 3, Sep 76
pp 543-549 manuscript received 25 Jun 75

[Abstract] The problem of flow around a blunted body is stated in its most general form: the gas is considered viscous, heat conducting, two-temperature, nonequilibrium ionized, radiating, and the transfer coefficients are determined according to the theory of higher approximations. The kinetic model of the gas (argon) includes collision reactions of atom-atom and electron-atom collision ionization through an excited level, as well as the reaction of photoionization from the ground level. The transfer factors are calculated and their influence on heat flux to the wall is analyzed. The studies show that under the initial conditions used, the influence of radiation on the flow field is slight and the radiation heat flux to the surface of the body is less than the convective heat flux. However, with increasing Mach number, $1/2$

USSR

GAVIN, L. B., LUN'KIN, YU. P. and MYMRIN, V. F., INZHENERNO-FIZICHESKIY ZHURNAL Vol 31, No 3, Sep 76 pp 543-549

the radiation contribution increases more rapidly than the convective contribution. Significant screening of the radiation flux by the wall boundary layer is also noted. References 19: 10 Russian, 9 Western.

USSR

UDC: 517.9

CHEREPENIN, N. D., Kazan'

CONCERNING THE MOTION OF A CYLINDER BENEATH THE FREE SURFACE OF A LIQUID

Kazan' IZVESTIYA VUZov, MATEMATIKA in Russian No 6(169), Jun 76 pp 81-90
manuscript received 16 Oct 72

[Abstract] A method is proposed for solving the problem of motion of a cylinder beneath the free surface of a liquid. It is assumed that the cross section of the cylinder is an ellipse C with semimajor axis a and semiminor axis b under the free surface of an ideal heavy liquid. The velocity vector V_0 is parallel to the unperturbed free surface and at an angle α to the semimajor axis of the ellipse. Flow is considered in the plane $z = x + iy$ with the x -axis along the level undisturbed free surface in the direction of motion, and the y -axis directed vertically upward over the center of ellipse C located at point $-ih$. The quantity h is assumed to be large compared with the size of the semimajor and semiminor axes. The problem is to find the complex potential of disturbed velocities $w(z) = \phi(x, y) + i\psi(x, y)$ -- a function that is analytical in the region D included between the ellipse C and the x -axis. The proposed method can be generalized to the case where C is any simple closed curve. References 7: 6 Russian, 1 Western.

1/1

USSR

UDC 532.529

ZLOBIN, V. and MOOS, M., Institute of Thermal Physics and Electrophysics,
Academy of Sciences Estonian SSR

MEASUREMENT OF DISCRETE PHASE PARAMETERS IN A SYSTEM MADE UP OF A TWO-PHASE
JET AND A TRANSVERSE FLOW

Tallin IZVESTIYA AKADEMII NAUK ESTONSKOY SSR, FIZIKA, MATEMATIKA in Russian
Vol 25, No 3, 1976 pp 292-298 manuscript received 12 Sep 75

[Russian abstract provided by the source]

[Text] An examination is made of the particulars of using an optical method for measuring the distribution of discrete phase when a two-phase jet with a heavy powdered additive is blown into a crossflow. In this case the intensity with which light is scattered is determined not only by the number of particles in the space being studied, but also by particle size. Measurements are done to determine the way that the intensity of the light scattered by a group of particles depends on the average size of the particles. Expressions are found for a measurement arrangement with small scattering angle that relate the intensity of the light scattered by a group of particles to their probability density function. Comparison with a probe method shows the feasibility of

1/2

USSR

ZLOBIN, V. and MOOS, M., IZVESTIYA AKADEMII NAUK ESTONSKOY SSR, FIZIKA, MATEMATIKA, Vol 25, No 3, 1976 pp 292-298

applying a modified optical method of measuring distribution of discrete phase to two-phase flows with a particle size distribution function that is highly deformable spatially. References 4 Russian.

2/2

KIRILLOV, V. A., OGARKOV, B. L. and VORONOV, V. G., Institute of Catalysis, Siberian Department, Academy of Sciences USSR, Novosibirsk

HYDRODYNAMIC REGIMES IN A STATIONARY THREE-PHASE GRANULAR LAYER. THEORETICAL ANALYSIS

Minsk INZHENERNO-FIZICHESKIY ZHURNAL in Russian Vol 31, No 3, Sep 76 pp 402-409
manuscript received 14 May 75

[Abstract] The authors consider physical models of movement of a gas-liquid mixture in granular packing based on experimental studies in a transparent column 100 mm in diameter with single-pass ascending flow. Five typical modes of flow are distinguished in this three-phase system: 1) bubble flow; 2) bullet flow in the channels between packing grains; 3) piston flow throughout the entire bed; 4) flow in a dispersed ring; 5) flow in droplets. In the first hydrodynamic regime, the gas flows as isolated bubbles. When the gas content exceeds a certain percentage (30-40%) there is a transition to bullet flow in which the bubbles are relatively large and stable, with length much greater than the diameter. As the flowrate increases, these bubbles merge to form channels between the packing grains. Conditions are found for transitions from the bullet regime to droplet and dispersed ring flow. Piston flow takes place

1/2

USSR

KIRILLOV, V. A., OGARKOV, B. L. and VORONOV, V. G., INZHENERNO-FIZICHESKIY ZHURNAL, Vol 31, No 3, Sep 76 pp 402-409

when the dimensions of the bubbles and liquid bridges coincide with the diameter of the packing column. Expressions are derived for the conditions resulting in each of these hydrodynamic regimes, and for transitions from one to the other. The next stage of the work will involve an experimental check on the resultant inequalities. References 9: 8 Russian, 1 Western.

2/2

USSR

UDC 533.601.17

CHERNYAK, YU. B., Scientific Research Institute of Nuclear Physics

PROPAGATION OF SHOCK WAVES IN WEAKLY COMPRESSIBLE MEDIA

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA. MATEMATIKA, MEKHANIKA in Russian
No 4, Jul/Aug 76 pp 75-83 manuscript received 10 Jan 75

[English abstract provided by the source]

[Text] A method is developed for integrating one-dimensional equations of gasdynamics describing the propagation of shock waves in condensed media. For this purpose the asymptotic behavior of hydrodynamic quantities at the discontinuity is considered when the adiabatic compressibility tends to zero. It is shown that the convective density derivative in the continuity equation is of higher order than the partial derivative. This means that the density configuration represents a step of variable height. In order to preserve the hypdrbolic character of the equations it is necessary to use as a zero approximation the continuity equation with the rejected convective density derivative. The equations thus obtained are integrable in the completely symmetric case. For arbitrary functions, a system of ordinary differential equations is constructed which contains only quantities at the discontinuity

1/2

USSR

CHERNYAK, YU. B., VESTNIK MOSKOVSKOGO UNIVERSITETA. MATEMATIKA, MEKHANIKA,
No 4, Jul/Aug 76 pp 75-83

and boundary. The method developed in the paper is applicable to phenomena occurring in weakly compressible media with arbitrary equations of state (which are rigorously taken into account in all approximations), and in particular to the propagation of detonation waves. The method is illustrated by the solution of the problem of non-local explosion in water. References 12 Russian.

2/2

USSR

UDC 533.6.01

SHURSHALOV, L. V., Computing Center of the Academy of Sciences USSR, Moscow

ON CALCULATING SHOCK WAVE PROPAGATION IN AN INHOMOGENEOUS ATMOSPHERE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 230, No 4, 1 Oct 76
pp 803-806 manuscript received 16 Jun 76

[Abstract] Three problems are considered within the theory of explosion in an inhomogeneous atmosphere with regard to important particulars of the Tungus meteorite: 1) propagation of shock waves under conditions where back pressure is appreciable (the explosion is not strong) and gravity must be taken into account; 2) calculation of the reflection of shock waves from the surface of the earth; 3) cylindrical explosion in an inhomogeneous atmosphere. These problems are solved numerically in a computational scheme based on two-dimensional flows of ideal gas in a gravitational field, using a cylindrical coordinate system. It is shown that the shape of the wave front is very similar for the spherical and cylindrical cases. Curves are given showing pressure distribution and the distribution of vertical velocity along axes of symmetry, as well as the velocity field when the shock wave has been reflected from the surface of the earth. References 10: 9 Russian, 1 Western.

1/1

USSR

UDC 532.517.4

NEUVAZHAYEV, V. YE. and YAKOVLEV, V. G., Chelyabinsk

ON THE THEORY OF TURBULENT INTERMIXING OF THE INTERFACE BETWEEN LIQUIDS IN A GRAVITATIONAL FIELD

Novosibirsk ZHURNAL PRIKLADNOY MEKHANIKI I TEKHNIЧЕСКОY FIZIKI in Russian No 4(98), Jul/Aug 76 pp 74-81 manuscript received 21 Jul 75

[Abstract] A semi-empirical theory is constructed to describe turbulent intermixing of two substances of constant density in a given gravitational field. It is shown that previous solutions of the problem are limited to small density ratios. A qualitative analysis of the solution found in this paper shows that the density gradient on the intermixing front has a discontinuity. On the basis of theoretical considerations and comparison with a previous solution [S. Z. Belen'kiy, Ye. S. Fradkin, "Theory of Turbulent Intermixing," Trudy FIAN imeni Lebedeva, Vol 29, 1965 pp 207-238], two empirical constants that determine the solution are approximated. The numerical dependence of intermixing asymmetry on the initial density differential is found. Curves are given illustrating the quantitative characteristics of the solution. References 3 Russian.

1/1

USSR

UDC 532.582.7+532.516.5

KUPTSOV, V. S., Voronezh

MOTION OF A SPHERICAL SOLID PARTICLE IN AN INHOMOGENEOUS FLOW OF VISCOUS INCOMPRESSIBLE FLUID

Novosibirsk ZHURNAL PRIKLADNOY MEKHANIKI I TEKHNICHESKOY FIZIKI in Russian No 4(98), Jul/Aug 76 pp 71-74 manuscript received 6 Oct 75

[Abstract] The author studies the influence that a solid spherical particle has on inhomogeneous flow of a viscous incompressible fluid, and derives equations of motion for the particle. The problem is solved in the Stokes approximation with accuracy to the cube of the ratio between the radius of the sphere and the distance from the center of the sphere to the singularities of the main flow. References 5: 2 Russian, 3 Western.

1/1

USSR

UDC 532.582.2

KULYAYEV, R. L., Novosibirsk

CALCULATION OF HYDRODYNAMIC INTERACTION OF CASCADES OF THIN BLADES WITH CONSIDERATION OF THE EVOLUTION OF VORTEX LAYERS

Novosibirsk ZHURNAL PRIKLADNOY MEKHANIKI I TEKHNICHESKOY FIZIKI in Russian No 4(98), Jul/Aug 76 pp 61-65 manuscript received 8 Jul 75

[Abstract] The author examines interference of two cascades of thin blades in a flow of inviscid, incompressible fluid, using a modification of a previously proposed method [Gorelov, D. N., Kulyayev, R. L., "The Nonlinear Problem of Unsteady Flow of an Incompressible Fluid Around a Thin Blade," Izvestiya Akademii Nauk SSSR, Mekhanika Zhidkosti i Gaza]. Flow is considered in the cartesian plane with the y-axis directed along the front of the cascades. The cascade on the left is taken as stationary, while the one on the right moves along the y-axis at a constant velocity. Flow outside the profiles of the blades and outside the vortex trails emanating from them is taken as potential. The cascade spacing is regular, the blade profiles are rigid, and the influence of the thickness of wakes and profiles is vanishingly small. Boundary conditions are formulated and a numerical solution is found for the problem of motion of the vortex layer. Two numerical examples are given. References 6: 1 Russian, 5 Western.

1/1

USSR

UDC: 533.7:541.12.012

TSIBAROV, V. A.

HYDRODYNAMIC EQUATIONS OF A FLUIDIZED BED

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA: MATEMATIKA, MEKHANIKA, ASTRO-NOMIYA in Russian No 3, Jul 76 pp 170-176 manuscript received 4 May 75

[Russian abstract provided by the source]

[Text] Based on a previous paper by the author [V. A. Tsibarov, "Kinetic Model of a Fluidized Bed," Vest. Leningr. Univ., No 13, 1975 pp 106-111] a system of equations is written for the hydrodynamics of a fluidized bed. The particles of solid phase may have different sizes, rotate, and also adsorb or desorb gas molecules. Certain gas reactions are permissible in the flow and on the surface of the solid particles. The solid particles cannot react with one another. References 5 Russian.

1/1

USSR

UDC. 534-13;534-143;551.596

BELAVIN, YU. S., KONSTANTINOV, F. I. and BOCHKAREV, A. V.

DEEP-WATER AUTOMATIC STATIONS FOR SEISMIC, ACOUSTIC AND HYDROPHYSICAL MEASUREMENTS IN THE OCEAN

[TRUDY] SAKHALINSKOGO KOMPLEKSNOGO NAUCHNO-ISSLEDOVATEL'SKOGO INSTITUTA DAL'NEVOSTOCHNOGO NAUCHNOGO TSENTRA AKADEMII NAUK SSSR [(Transactions) of the Sakhalin Scientific Research Institute for Comprehensive Studies of the Far Eastern Science Center of the Soviet Academy of Sciences] in Russian No 34, 1975 pp 94-108

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7Zh877 by the authors]

[Text] The paper gives a survey of theoretical information on self-contained automatic deep-water stations for recording the hydrophysical parameters of a medium. An examination is made of the design particulars of a number of automatic stations. Note is taken of the features of progressive technical solutions of certain problems facing the developer of research equipment in this category. References 28.

1/1

USSR

UDC 621.378.325

PRIVALOV, V. YE. and FILATOV, YU. V., All-Union Scientific Research Institute of Metrology imeni D. I. Mendeleyev, Leningrad

INFLUENCE OF CHANGE IN MODAL COMPOSITION OF RADIATION ON THE FREQUENCY CURVE OF A GAS RING LASER

Leningrad ZHURNAL TEKHNIЧЕСКОY FIZIKI in Russian Vol 46, No 9, Sep 76
pp 1888-1894 manuscript received 10 Jun 74 and 27 Mar 75

[Russian abstract provided by the source]

[Text] The authors examine the scale factor of a rotating ring laser (linearly relating the frequency difference of opposed waves to rotating speed) during transition from single-mode to two-mode stimulated emission. They demonstrate that such an approach leads to a sudden change in the scale factor by a relative amount of approximately $3 \cdot 10^{-3} G$, where G is the amplification of the active medium for one pass. Comparison of the computed amount of change in the scale factor with experimental data gave good agreement and showed that the reason for change in the scale factor is the change in dispersion caused by the onset of additional troughs in the inverse population curve. References 13: 8 Russian, 5 Western.

1/1

USSR

UDC 621.378.325

PEKAR, V. S.

KINETICS OF A FLAT WAVEGUIDE LASER WITH A SEMITRANSSPARENT WALL AND AN INVESTIGATION OF IT USING EXTERNAL PRELIMINARY IRRADIATION

Leningrad ZHURNAL TEKHNIЧЕСКОY FIZIKI in Russian Vol 46, No 9, Sep 76
pp 1879-1887 manuscript received 2 Feb 76

[Russian abstract provided by the source]

[Text] The author finds and, in the stationary case, solves the kinetic equations for a plane waveguide laser in which the radiation, as a result of scattering on random optical heterogeneities, travels to a vacuum through the wall of the waveguide at discrete angles to the layer. The author examines the influence of external preliminary irradiation on the operating mode of the laser. This irradiation, depending on its frequency, may appear as: (1) additional pumping, (2) light penetrating into the working mode as a result of scattering and additionally stimulating radiation, and (3) an independent beam mirror-reflected from the multi-layer system and amplified in it. The author gives the formulas which

1/2

USSR

PEKAR, V. S., ZHURNAL TEKHNIЧЕСКОY FIZIKI Vol 46, No 9, Sep 76 pp 1879-1887

permit determining the basic parameters of the laser from experiments with external preliminary irradiation. The author discusses the optimal values of the parameters. References 7 Russian.

2/2

USSR

UDC 621.378.33

BYCHKOV, YU. I., KUDRASHOV, V. P., OSIPOV, V. V. and SAVIN V. V., Institute of Atmospheric Optics, Siberian Branch of the Academy of Sciences USSR, Tomsk

INFLUENCE OF THE PARAMETERS OF THE ACTIVE MEDIUM ON RADIATION ENERGY FROM AN ELECTRIC DISCHARGE CO₂ LASER

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 3, No 7[49], Jul 76 pp 1558-1563
manuscript received 15 Dec 75

[Russian abstract provided by the source]

[Text] The authors discuss a model for computing the power-energy characteristics of pulsed CO₂ lasers. For the case of excitation of the active medium by an independent discharge they find and explain the dependences of radiation energy on energy contributions, composition and pressure of the active medium. The best agreement between the computed and the experimental data is achieved in the region of low specific energy contributions. References 15: 7 Russian, 8 Western.

1/1

USSR

UDC 621.378.325:658.382.3

KIRILLOV, A. I., NAUMOV, A. S., MORSKOV, V. F., TORSHINA, N. F. and
USTINOV, N. D.

ON THE QUESTION OF MONITORING LASER RADIATION

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 3, No 7[49], Jul 76 pp 1394-1402
manuscript received 21 Jul 75

[Russian abstract provided by the source]

[Text] The authors demonstrate the necessity of the All-Union standards which include scientifically based maximally allowable radiation doses of individual organs and the human organism as a whole. They also classify all laser production from the viewpoint of operating safety of the service personnel and the means and methods of monitoring laser radiation. They also examine certain recommendations on classifying criteria of injury and methods of measuring energy density (power) during irradiation. References 7: 3 Russian, 4 Western.

1/1

USSR

UDC 621.378.325+535.231.12

BAUTIN, A. V., POLYAKOV, YU. A. and SHILYAYEV, A. A.

ON THE QUESTION OF MEASURING THE SPACE-TIME DISTRIBUTION OF LASER RADIATION
INTENSITY

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 3, No 7[49], Jul 76 pp 1527-1533
manuscript received 21 Nov 75

[Russian abstract provided by the source]

[Text] The authors examine the problem of measuring the intensity distribution in the cross section of a beam of laser radiation when it is appreciably non-gaussian. They show that in certain instances the distribution in the one-dimensional case can be approximated by a Charlier curve. They give the results of experimental investigations for a laser with a spherical confocal resonator. The experimental curves are approximated by a Charlier distribution with 10% accuracy. References 12 Russian.

1/1

USSR

UDC 621.378.9:621.396

SYMERA, T. P., UUSMAA, P. A., KHINRIKUS, KH. V. and MAL'SUB, YU. E., The Polytechnic Institute, Tallin

PROBABILITY OF ERROR IN AN ATMOSPHERIC LASER COMMUNICATION LINE

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 3, No 7[49], Jul 76 pp 1403-1411
manuscript received 2 Oct 75

[Russian abstract provided by the source]

[Text] The authors investigate the probability of error in an atmospheric laser communication line. The duplex communication system with a helium-neon laser operated in the mode of transmitting discrete information using orthogonal polarization modulation. The probability of error in the system depends substantially on the degree of atmospheric turbulence. They compare the influence of fluctuations in intensity and spatial fluctuations of the laser beam on the probability of error in the system. They show that the probability of error is determined not only by fluctuations in intensity but also by fluctuations in the cross section of the laser beam at the point of reception. The influence of beam straying can be eliminated by automatic beam tuning. References 14: 8 Russian, 6 Western.
1/1

USSR

UDC 535.311.2:621.378.9

VINOKUROV, G. N., MAK, A. A., STARIKOV, A. D., TUZOV, V. G. and SHATSEV, A. N.

SPHERICAL IRRADIATION OF TARGETS BY POWERFUL LASER BEAMS

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 3, No 7[49], Jul 76 pp 1591-1597
manuscript received 30 May 75

[Russian abstract provided by the source]

[Text] The authors discuss the design principles for optical arrangement used in the spherically symmetric irradiation of small targets by laser emission. They make computations of the illumination of the surface of a spherical target during its irradiation by six and nine gaussian beams. They analyze the influence of position and parameters of laser beams on the characteristics of irradiation and examine methods for further improvement in uniformity of target illumination. References 7: 3 Russian, 4 Western.

1/1

USSR

UDC 535.41+621.378.33

ZEL'DOVICH, B. YA. and SAAKYAN, D. B., The Physics Institute imeni P. N. Lebedev, USSR Academy of Sciences, Moscow

ON THE DEGREE OF SPATIAL RADIATION COHERENCE OF A SINGLE-MODE LASER

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 3, No 7[49], Jul 76 pp 1598-1601
manuscript received 7 Jan 76

[Russian abstract provided by the source]

[Text] On the basis of concepts involved in the subthreshold noise excitation of modes with higher transverse indices, the authors derive theoretical estimates of the degree of spatial radiation coherence of a laser working on modes with the lowest transverse index. They demonstrate that it is necessary to control the laser geometry and operating conditions in order to compare the theoretical and experimental data. References 15: 13 Russian, 2 Western.

USSR

ASKAR'YAN, G. A., DATSKEYEVICH, N. P., KARLOVA, YE. K., KUZ'MIN, G. P. and NIKIFOROV, S. M., Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR

AEROSTATICS IN LASER AND MICROWAVE BEAMS

Moscow PIS'MA V ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI in Russian Vol 24, No 26, 20 Sep 76 pp 360-362 manuscript received 16 Aug 76

[Abstract] It is shown that the output parameters of existing lasers are adequate for creating archimedean lift and directing the motion of aerostatic objects. A demonstration experiment was done with a helium balloon in which 600 J of laser energy was absorbed. Besides archimedean forces, the laser beam can control motion by the radiometric force due to repulsion of the medium from the heated surface of the balloon or from a special target, as well as the gasdynamic pressure associated with ignition of the laser flare. The laser flare can be focused by a mirror to heat a working fluid. The same lifting and controlling forces can be produced by powerful microwave beams. The proposed technique could be used to control balloons carrying scientific packages from the ground, and to create "tubes" of beams to prevent balloons from drifting. References 9: 7 Russian, 2 Western.

USSR

UDC 621.373:535

ASIMOV, M. M. and RUBINOV, A. N.

MEASUREMENT OF AMPLIFICATION SPECTRA AND TRIPLET-TRIPLET ABSORPTION SPECTRA OF ORGANIC COMPOUNDS USING A FREQUENCY-TUNABLE DYE LASER

Leningrad OPTIKA I SPEKTROSKOPIYA in Russian Vol 41, No 3, Sep 76 pp 451-455
manuscript received 7 Jul 75

[Russian abstract provided by the source]

[Text] Using a frequency-tunable dye laser as a probing source, the authors measure the amplification spectrum of ethanol solutions of Rhodamine-6G, Rhodamine-4S and β -methylumbelliferone. Flash lamps were used for investigating the stimulated emission of these dyes. The pumping pulse had a rise time of 10 μ s and a flat section with duration of ~ 25 μ s. The triplet-triplet absorption spectrum for the investigated dyes was found from the difference of the amplification spectra measured for two successive times within the limits of this flat section. References 8: 4 Russian, 4 Western.

1/1

USSR

UDC 621.373:535

IVANOV, E. I., PETROV, V. I. and PETROVA, N. N.

STIMULATED EMISSION SPECTRUM OF A HELIUM-NEON LASER AS A FUNCTION OF THE FREQUENCY OF Q-SWITCHING OF THE LASER CAVITY

Leningrad OPTIKA I SPEKTROSKOPIYA in Russian Vol 41, No 3, Sep 76 pp 498-499
manuscript received 21 Jul 75

[Abstract] A report on the results of investigation of the behavior of the emission spectrum of a helium-neon laser as the Q-switching frequency varies. The Q-switch was a Pockels crystal of deuterated MKP near one of the mirrors. The spectrum of the stimulated emission was analyzed by a scanning Fabry-Perot interferometer. The spectrum of free emission was made up of two or three longitudinal modes. When the Q-switch was biased to increase the level of nonselective losses, the mode with maximum frequency was quenched, then the adjacent mode and so forth, the last one to be quenched being that with the lowest frequency. As the Q-switching frequency approaches the frequency of intermode beats, the spectrum becomes synchronized and changes in shape as compared with the spectrum of free emission. The number of modes immediately increases to seven or eight, and there is an optimum Q-switching frequency where the envelope of the spectrum becomes symmetric, approximating a

1/2

USSR

IVANOV, E. I., PETROV, V. I. and PETROVA, N. N., OPTIKA I SPEKTROSKOPIYA, Vol 41, No 3, Sep 76 pp 498-499

gaussian curve, and the output power reaches a maximum. The center of the envelope of the unsynchronized spectrum is somewhat higher in frequency than that of the optimally synchronized spectrum. The behavior of the emission spectrum depends on the sign of the difference between the Q-switching frequency and the optimum: the envelope maximum of the mode spectrum shifts toward lower frequencies for a positive difference, and toward higher frequencies for a negative difference. This is attributed to the asymmetry of the emission line of the He-Ne laser. References 4: 3 Russian, 1 Western.

2/2

USSR

UDC 621.373:535

LISYUK, YU. V.

THE RELATIVISTIC DOPPLER EFFECT AND RING LASER EMISSION MODES

Leningrad OPTIKA I SPEKTROSKOPIYA in Russian Vol 41, No 3, Sep 76 pp 482-484
manuscript received 9 Jan 73

[Abstract] An investigation is made of the influence that the transverse Doppler effect has on propagation of a monochromatic wave in a gas in resonance with the $2 \rightarrow 1$ transition of the gas atoms. An expression is found for the negative shift and broadening of the Bennet spectral dip due to the influence of the transverse Doppler effect. It is shown that the relativistic Doppler effect has an appreciable influence on the formation of sharp power resonances in gas ring lasers. References 7: 6 Russian, 1 Western.

1/1

LEVIN, M. B. and CHERKASOV, A. S.

QUANTITATIVE DETERMINATION OF THE EFFICIENCY INCREASE FOR PUMPING A RHODAMINE 6G LASER WITH TUBE STIMULATION WHEN FLUORESCING FILTERS ARE USED

Leningrad OPTIKA I SPEKTROSKOPIYA in Russian Vol 41, No 3, Sep 76 pp 446-450
manuscript received 28 May 75

[Abstract] An investigation is made of the use of fluorescing filters to increase laser pumping efficiency. The filter efficiency under specific conditions can be characterized as the ratio of the number of quanta of luminescent emission N_a absorbed by the active medium to the number of quanta N_f absorbed by the filter upon exposure to the light source $f = N_a/N_f$. On the other hand, this quantity may be defined as the product of the quantum yield of filter fluorescence ϕ , the coefficient of transmission of the fluorescence light to the active medium K_{tr} , and a coefficient P that is numerically equal to the percentage of the fluorescent light quanta incident on the active medium that are actually absorbed: $f = \phi K_{tr} P$. Thus if f can be experimentally found for a specific system, the values of K_{tr} and P can be calculated from the known value of ϕ . This paper gives the results of such experiments for a system made up of an ethanol solution of Rhodamine 6G

1/2

USSR

LEVIN, M. B. and CHERKASOV, A. S., OPTIKA I SPEKTROSKOPIYA, Vol 41, No 3, Sep 76 pp 446-450

in a cylindrical cell plus a fluorescing filter -- an ethanol solution of a mixture of 2-acetyl-9,10-diphenylanthracene ($2 \cdot 10^{-3}$ M) and 2-acetylanthracene ($2 \cdot 10^{-3}$ M) -- filling the space between the cell and a larger coaxial quartz tube. The filter was fluoresced by light on 365 nm isolated by a filter set that was placed in front of a mercury vapor lamp. Estimates are made of the possibilities for improving pumping efficiency for this type of dye laser by increasing the value of f . It is found that f can be increased by adding 1,4-diphenylbutadiene as a triplet quencher to the fluorescing light filter solution. References 10: 7 Russian, 3 Western.

2/2

USSR

BEYGMAN, I. L., BOYKO, V. A., PIKUZ, S. A. and FAYENOV, A. YA., Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR

COLLISIONAL DE-EXCITATION OF METASTABLE LEVELS AND THE INTENSITIES OF COMPONENTS OF THE RESONANCE DOUBLET OF HYDROGEN-LIKE IONS IN A LASER PLASMA

Moscow ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI in Russian Vol 71, No 3(9), Sep 76 pp 975-983 manuscript received 17 Mar 76

[Russian abstract provided by the source]

[Text] An examination is made of de-excitation of the metastable 2s level in hydrogen-like ions when they collide with charged particles. An experiment is described on measurement of the relative intensities of components of the fine structure of hydrogen-like ions in a laser plasma. The process of de-excitation of the 2s level and the assumption that the plasma is optically thick in the resonance line provide a qualitative interpretation of the experimental data. References 17: 13 Russian, 4 Western.

1/1

USSR

UDC 621.039.66

PYATNITSKIY, L. N., ZHIVOPISTSEV, V. S., ZRODNIKOV, V. S. and CHINNOV, V. F., Institute of High Temperatures, Academy of Sciences USSR

LASER DIAGNOSIS OF A NONEQUILIBRIUM SHF DISCHARGE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 230, No 5, 11 Oct 76 pp 1092-1094 manuscript received 15 Mar 76

[Abstract] Experiments are described in which a plasma of inert gases and mixtures of inert gases with hydrogen was excited in a coaxial SHF plasmatron operating on a frequency of 915 MHz. The discharge arose on the end of the central conductor of the coaxial line; the extended plasma filament was stabilized by swirling the gas and using a quartz nozzle. The probe used for discharge diagnosis was a Q-switched ruby laser with pulse energy of 4 J and duration of 20-30 ns. The optics consisted of a focusing system, an absorbing trap to catch scattered emission and a DFS-12 spectrum analyzer. The technique used for determining plasma parameters from the scattered emission spectrum is explained. Experimental results show that ambipolar diffusion causes appreciable deviation from the ionization equilibrium described by the Saha equation in an argon-hydrogen plasma. References 5: 4 Russian, 1 Western.

1/1

KURBATOV, L. N., associate member of the Academy of Sciences USSR, ROMANOV, G. N., FROIMSON, I. M. and MAKHIDZHANOV, S. S.

NEW OPTICAL SYSTEMS FOR SEMICONDUCTOR LASERS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 230, No 5, 11 Oct 76
pp 1081-1084 manuscript received 6 May 76

[Abstract] The authors consider two approaches to the problem of developing semiconductor lasers with stimulated emission perpendicular to the plane of the p-n junction: 1) amplification and emission in the vicinity of a caustic curve, and 2) distributed output of stimulated emission in a laser scheme with active "antiwaveguide." It is shown by considerations of geometric optics that the cross section of the tube of rays near a caustic curve approaches zero while the field amplitude is maximum. With increasing distance from the caustic the tube diverges and the cross section increases. This expansion reduces the luminous flux incident on the mirror and gives beams with low diffraction divergence. Electromagnetic waveguide propagation depends on the phenomenon of total internal reflection. When the waveguide structure is surrounded by a denser medium, emission cannot be localized within it, and the structure becomes an "antiwaveguide." If the

1/2

USSR

KURBATOV, L. N., ROMANOV, G. N., FROIMSON, I. M. and MAKHIDZHANOV, S. S.,
DOKLADY AKADEMII NAUK SSSR, Vol 230, No 5, 11 Oct 76 pp 1081-1084

"antiwaveguide" is active, it becomes possible under certain conditions of excitation to compensate emission losses of the structure. This enables distributed output of emission over the entire length of the "antiwaveguide" with avoidance of the undesirable effects associated with gain saturation in semiconductor lasers. It is found that the first "mode" of the "antiwaveguide" has the minimum emission threshold when a plane wave is incident on the side wall of the structure at a maximum angle. It is pointed out that these optical structures can be combined in a semiconductor laser with stimulation of emission in the vicinity of a caustic and coupling out in the "antiwaveguide" scheme. References 4: 3 Russian, 1 Western.

2/2

USSR

UDC 537.529

BAKULIN, YU. D., KUROPATENKO, V. F. and LUCHINSKIY, A. V.

MAGNETOHYDRODYNAMIC CALCULATION OF EXPLODING WIRES

Leningrad ZHURNAL TEKHNIЧЕСКОY FIZIKI in Russian Vol 46, No 9, Sep 76
pp 1963-1969 manuscript received 17 Feb 75

[Russian abstract provided by the source]

[Text] The authors propose a method of calculating electrical circuits with exploding wires. This technique can be used for magnetohydrodynamic computation of the explosion of copper wires with an accuracy that is sufficient for practical purposes throughout the entire explosion process. By experimental computation they found the dependence of the copper conductivity on density and specific thermal energy. In the computations they use the equation of the state of the metal, taking its vaporization into account. They cite the results of the computations and discuss their agreement with experimental data. References 11: 10 Russian, 1 Western.

1/1

USSR

UDC 533.95

ZHILINSKIY, A. P., Leningrad Polytechnic Institute imeni M. I. Kalinin

ON THE STABILITY OF AN ISOTHERMAL PLASMA IN A MAGNETIC FIELD AND KINETIC ATTENUATION OF ION-SONIC WAVES

Leningrad ZHURNAL TEKHNIЧЕСКОY FIZIKI in Russian Vol 46, No 9, Sep 76
pp 1839-1845 manuscript received 17 Feb 75

[Russian abstract provided by the source]

[Text] The author estimates the stability of transverse ionsonic and anti-drift waves in a magnetized plasma when the electron temperature is approximately the same as the ion temperature in the absence of macroscopic currents. He demonstrates that in those cases when Landau attenuation occurs as a consequence of ion movement transverse to the magnetic field, the electron drift and finite ion inertia do not lead to wave excitation in an isothermal plasma. Antidrift waves may be excited only when T_e/T_i is greater than or approximately equal to 2, and ion-sonic waves when T_e/T_i is greater than or approximately equal to 3.5. For a bounded plasma the author discusses conditions in which the waves, propagating across the concentration gradient, in the kinetic approximation do not undergo attenuation caused by resonance particles. References 7: 5 Russian, 2 Western.

1/1

USSR

UDC 621.378.33

GAVRIKOV, V. F., DRONOV, A. P., ORLOV, V. K., PISKUNOV, A. K. and
SHIKANOV, V. L.

VIBRATIONAL RELAXATION OF CARBON MONOXIDE IN SUPERSONIC FLOWS

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 3, No 7[49], Jul 76 pp 1483-1493
manuscript received 30 Oct 75

[Russian abstract provided by the source]

[Text] The authors present the results of numerical computations of the vibrational relaxation of CO-Ar mixtures in expanding supersonic flows. They investigate the influence of the geometry, temperature and pressure in the critical cross section of the nozzle on the coefficients of amplification of the medium. They show that at a distance of 4 cm from the critical cross section of the nozzle it is possible to achieve coefficients of amplification of greater than $5 \cdot 10^{-2} \text{ cm}^{-1}$ for one-quantum vibrational-rotational transitions of carbon monoxide and a degree of expansion of the nozzle of 100. They investigate the influence of V-T and V-V processes on the distribution function for the vibrational states of carbon monoxide molecules. They cite the conditions under which

1/2

USSR

GAVRIKOV, V. F., DRONOV, A. P., ORLOV, V. K., PISKUNOV, A. K. and
SHIKANOV, V. L., KVANTOVAYA ELEKTRONIKA Vol 3, No 7[49], Jul 76
pp 1483-1493

complete inversion is achieved on individual vibrational-rotational transitions. They show the possibility of creating a gas-dynamic laser operating on two-quantum transitions of a CO molecule with a wavelength from 2.3 to 2.7 micrometers. They investigate the influence of the amount of carbon monoxide in a CO-Ar mixture on the coefficient of amplification and make a comparison with the experiment. References 46: 11 Russian, 35 Western.

KAPYSHEV, V. K. and STARYKH, V. V., Institute of Atomic Energy imeni I. V. Kurchatov, Moscow

A METHOD OF CALCULATING DIATOMIC IONIC MOLECULAR SYSTEMS USING TWO-CENTER MOLECULAR WAVE FUNCTIONS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 230, No 4, 1 Oct 76
pp 830-833 manuscript received 19 Mar 76

[Abstract] A method is proposed for calculating the potential of interaction of two atoms

$$V(R) = \left(E_e(R) + \frac{Z_a Z_b e^2}{R} \right) - 2E_A$$

in which errors are compensated by using the same method for calculating E_e and E_A , using one-electron two-center wave functions $\Psi_i^{(0)}$ that are found by solving the Schrödinger equation for an electron moving in the field of two fixed nuclei with arbitrary charges:

$$\left(-\nabla_i^2 - \frac{2\alpha_i Z_a}{r_{ai}} - \frac{2\beta_i Z_b}{r_{bi}} \right) \Psi_i^{(0)} = E_i^{(0)} \Psi_i^{(0)}.$$

1/2

USSR

KAPYSHEV, V. K. and STARYKH, V. V., DOKLADY AKADEMII NAUK SSSR, Vol 230, No 4, 1 Oct 76 pp 830-833

The effectiveness of the proposed method was verified by calculating the potential of interaction of two helium atoms in the ground state. Although this system has been extensively studied, the discrepancies between the results of ab initio calculations and experimental data are considerable. The accuracy of the proposed method is found to be within experimental error, and in any case comparable with the accuracy of semiempirical methods. It is shown that the two-center approximation is important in accounting for polarization effects. Over a wide range of internuclear distances the accuracy of existing calculations of the potential of interaction of helium atoms is improved by an average factor of 5-10, and the improvement in the region of maximum errors amounts to a factor of 50-100. References 15: 5 Russian, 10 Western.

2/2

USSR

UDC 533.9

VLASOV, V. V., ROZHKOV, A. M. and FARENIK, V. I., Khar'kov State University

PARAMETRIC EXCITATION OF DRIFT OSCILLATIONS, AND FAST ELECTRONS IN A PLASMA

Kiev UKRAINSKIY FIZICHESKIY ZHURNAL in Russian Vol 21, No 9, Sep 76
pp 1570-1572 manuscript received 20 Apr 76

[Russian abstract provided by the source]

[Text] The paper gives the results of experimental studies of the parametric excitation of high frequency and low frequency drift oscillations of a plasma in an alternating electric field with frequency near lower hybrid resonance. It is shown that the excitation of oscillations occurs under decay conditions, has a threshold nature and is accompanied by the appearance of a group of accelerated electrons. References 5.

1/1

USSR

UDC 533.9.07

ALEKSIN, V. F., PYATOV, V. N., SEBKO, V. P. and TYUPA, V. I., Institute of Physical Technology, Academy of Sciences UkSSR, Khar'kov

ANGLES OF ROTARY TRANSFORMATION OF A STELLARATOR WITH LONGITUDINAL CURRENT IN THE PLASMA

Kiev UKRAINSKIY FIZICHESKIY ZHURNAL in Russian Vol 21, No 9, Sep 76
pp 1534-1540 manuscript received 11 Mar 76

[Abstract] Exact solutions are found for the differential equations for the practically important case of a three-twin stellarator with a current-carrying plasma. The case of parabolic distribution of longitudinal current density along the radius is studied. The exact expressions for angles of rotary transformation are compared with approximate expressions found by the method of successive approximations (or averaging). The method of averaging is used to study the influence of plasma pressure on properties of rotary transformation in a stellarator with longitudinal current as well. The calculations indicate that the effect of plasma pressure may be ignored up to $\beta \approx 2 \cdot 10^{-3}$ in calculating the angular characteristics. Even in a zero-current configuration, a change in exponent k from 1 to ∞ causes a deviation in angles of rotation at the 1/2

USSR

ALEKSIN, V. F., PYATOV, V. N., SEBKO, V. P. and TYUPA, V. I., UKRAINSKIY FIZICHESKIY ZHURNAL Vol 21, No 9, Sep 76 pp 1534-1540

axis of approximately 30%. As longitudinal current increases, this deviation becomes significantly less due to the increase in rotary transformation along the magnetic axis. References 9: 6 Russian, 3 Western.

2/2

USSR

UDC 538.569

BESSONOV, YE. G., KURAKIN, V. G. and SEROV, A. V., Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR, Moscow

IMPACT ACCELERATION OF CHARGED PARTICLES BY AN ELECTROMAGNETIC WAVE

Leningrad ZHURNAL TEKHNIЧЕСКОY FIZIKI in Russian Vol 46, No 9, Sep 76 pp 1984-1987 manuscript received 10 Mar 75

[Abstract] The authors examine the basic features involved in the motion of a bunch of charged particles in the field of an electromagnetic wave. They ignore the interaction of the particles within the bunch and assume that the transverse velocity components of all the particles in the bunch are equal to zero. They discuss the relative energy, momentum and phase of a particle as well as the potential function. Using the described method they were able to theoretically produce a beam of relativistic particles of brief duration and small energy scatter. References 6 Russian.

1/1

USSR

UDC 621.384.634

ANOSOV, V. N., DENISOV, YU. N., DMITRIYEVSKIY, V. P. and KOL'GA, V. V.

INVESTIGATION OF THE PROCESS OF MOTION AND CORRECTION OF THE BUNCH PHASE IN AN ISOCHRONOUS CYCLOTRON

Leningrad ZHURNAL TEKHNIЧЕСКОY FIZIKI in Russian Vol 46, No 9, Sep 76
pp 1868-1872 manuscript received 20 Jan 75

[Russian abstract provided by the source]

[Text] The authors suggest a statistical approach to solving the problem of selecting tolerances for precision in shimming and precision in stabilizing the magnetic field in isochronous cyclotrons. They also touch upon questions of correcting the phase motion and the related parameters of an accelerated particle bunch. References 7: 5 Russian, 2 Western.

1/1

USSR

UDC 533.95

BYCHENKOV, V. YU. and SILIN, V. P., Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR, Moscow

GENERATION OF FAST ELECTRONS IN A PARAMETRICALLY UNSTABLE PLASMA

Leningrad ZHURNAL TEKHNIЧЕСКОY FIZIKI in Russian Vol 46, No 9, Sep 76
pp 1830-1838 manuscript received 24 Mar 75

[Russian abstract provided by the source]

[Text] The authors examine the generation of fast electrons in a parametrically unstable plasma with a stationary spectrum of the potential field fluctuations due to the interaction of particles with rf oscillations. Using one-dimensional relaxation as an example they demonstrate the possibility of the onset of a two-temperature Maxwell distribution. In the three-dimensional case they find the electron distribution function which is independent of the longitudinal component of particle velocity in the region of anomalous diffusion (with respect to the direction of the external field). They compute the number of accelerated electrons and their energy. References 17: 10 Russian, 7 Western.

1/1

BONDARENKO, I. M., GERASIMOV, V. P., GLUKHIKH, V. A., GUSEV, O. A., IVANOV, A. S., KUZNETSOV, V. S., MELLEKH, YE. M., PAVLOV, YE. P. and SVIN'IN, M. P.

HIGH-CURRENT PULSED ELECTRON ACCUMULATORS FOR THE MICROSECOND RANGE WITH INDUCTIVE ENERGY ACCUMULATORS

Leningrad DOKLADY VSESOYUZNOGO SOVESHCHANIYA PO INZHENERNYM PROBLEMAM UPRAVLYAYEMOGO TERMOYADERNOGO SINTEZA [Reports of the All-Union Conference on Engineering Problems of Controlled Thermonuclear Fusion] in Russian Vol 2, 1975 pp 91-105

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V433 by Ye. G. Krastelev]

[Text] A brief analysis is made of several versions of high-current electron accelerators using inductive energy accumulators. The use of inductive accumulators appreciably increases the stored energy densities over conventional capacitive accumulators, thus reducing the size and cost of the installations. Moreover, the magnetic field of the inductive accumulator can be used to shape and focus the resultant beams. This paper gives the basic parameters of installations with inductive energy accumulators that have already been put into

1/2

USSR

BONDARENKO, I. M., GERASIMOV, V. P., GLUKHIKH, V. A., GUSEV, O. A., IVANOV, A. S., KUZNETSOV, V. S., MELLEKH, YE. M., PAVLOV, YE. P. and SVIN'IN, M. P., DOKLADY VSESOYUZNOGO SOVESHCHANIYA PO INZHENERNYM PROBLEMAM UPRAVLYAYEMOGO TERMOYADERNOGO SINTEZA, Vol 2, 1975 pp 91-105

operation, and that are now being set up at the NIIIEFA Institute imeni D. V. Yefremov. Problems of a structural nature are discussed regarding the most critical members of the accelerators, and design sketches are given for two types of machines.

2/2

AFONIN, I. P., BABYKIN, M. V. and BARTOV, A. V.

CONCERNING THE PROBLEM OF MULTICHANNEL COMMUTATION IN HIGH-CURRENT PULSED ELECTRON ACCUMULATORS

Leningrad DOKLADY VSESOYUZNOGO SOVESHCHANIYA PO INZHENERNYM PROBLEMAH UPRAVLYAYEMOGO TERMOYADERNOGO SINTEZA [Reports of the All-Union Conference on Engineering Problems of Controlled Thermonuclear Fusion] in Russian Vol 2, 1975 pp 117-126

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V434 by L. Zubkov]

[Text] The paper describes the results of experiments on multichannel commutation of peaking gas gaps on low-resistance lines. In these experiments more than 100 sparks were observed on a line width of 46 cm in a gap of the order of 1 cm in air at atmospheric pressure for peaking of a pulse with amplitude of 50 kV and initial rise time of about 25 ns in the peaking gap of a flat line with wave impedance of $\rho = 1 \Omega$. Peaking of the rise time to 7.5 ns was achieved under these conditions. Photographs taken with the PIM-3 image converter are given showing the behavior of spark cross sections

1/2

USSR

AFONIN, I. P., BABYKIN, M. V. and BARTOV, A. V., DOKLADY VSESOYUZNOGO SOVESHCHANIYA PO INZHENERNYM PROBLEMAH UPRAVLYAYEMOGO TERMOYADERNOGO SINTEZA, Vol 2, 1975 pp 117-126

in time. They show that the build-up of spark channels takes about 5 ns. It is pointed out that in order to utilize this phenomenon a pulse must first be shaped with a rise time of the order of a few tens of ns. It was also established in the experiments that when the initial rise time of the pulse is lengthened to 150 ns, multiple breakdown does not develop, and only one channel is observed to form upon self-breakdown. It is noted that multiple breakdown with lengthened rise time was achieved by introducing a controlling electrode into the working gap. In this case a pulse was fed to the controlling electrode with a rise time of about 20 ns and an amplitude of the order of 15% of the voltage in the main gap. This resulted in up to ten channels distributed over the line width even with fixed voltage across the main electrodes.

2/2

ZVEREV, G. I., SUROVTSEV, V. G. and VOLKOV, L. S.

A HIGH-VOLTAGE PULSE MODULATOR FOR THE 'KLIN-V' HIGH-CURRENT ELECTRON ACCELERATOR

Leningrad DOKLADY VSESOYUZNOGO SOVESHCHANIYA PO INZHENERNYM PROBLEMA M UPRAVLYAYEMOGO TERMOYADERNOGO SINTEZA [Reports of the All-Union Conference on Engineering Problems of Controlled Thermonuclear Fusion] in Russian Vol 2, 1975 pp 153-159

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V435 by L. Zubkov]

[Text] The paper describes the design of a high-current electron accelerator now under development with the following design parameters: pulse power $4 \cdot 10^{10}$ W, maximum voltage 500 kV, maximum pulse current 80 kA, pulse duration 60 ns, recurrence cycle once per minute. The basic accelerator design will be: a high-voltage rectifier, voltage pulse oscillator, unary shaping line on water ($\rho = 6 \Omega$) and a field emission diode. It is noted that during the alignment process the line was charged from a voltage pulse oscillator type GIN-400-0.06/5 made up of capacitor units. Four such units connected pairwise

1/2

USSR

ZVEREV, G. I., SUROVTSEV, V. G. and VOLKOV, L. S., DOKLADY VSESOYUZNOGO SOVESHCHANIYA PO INZHENERNYM PROBLEMA M UPRAVLYAYEMOGO TERMOYADERNOGO SINTEZA, Vol 2, 1975 pp 153-159

in series-parallel were used. The maximum stored energy was 3.84 kJ, and the output voltage was 800 kV. The time for charging the line was 0.5 μ s. Ion exchange resins type KU-2+AV-17 were used to purify the water.

2/2

AVRAMENKO, M. I., GLUKHIKH, V. A., GUSEV, O. A., KOMAR, YE. G., KOMAROV, O. L., KUZNETSOV, V. S. and SVIN'IN, M. P.

SHAPING OF AN ANNULAR ELECTRON BEAM IN A HIGH-CURRENT ACCELERATOR WITH INDUCTIVE ACCUMULATOR

Leningrad DOKLADY VSESOYUZNOGO SOVESHCHANIYA PO INZHENERNYM PROBLEMAH UPRAVLYAYEMOGO TERMOYADERNOGO SINTEAZ [Reports of the All-Union Conference on Engineering Problems of Controlled Thermonuclear Fusion] in Russian Vol 2, 1975 pp 106-116

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, Abstract No 7V439 by Ye. G. Krastalev]

[Text] An examination is made of an arrangement for shaping and focusing a tubular electron beam in a high-current accelerator with inductive energy accumulator. The system is based on using the magnetic field of the inductive accumulator, which is adequate in machines of this type to prevent defocusing action of the beam's space charge forces. When the magnetic field increases lengthwise of the accelerator, the beam current density can be increased over the cathode emission current density while retaining the tubular structure of the beam with given radius-to-thickness ratio. Estimates are made of the

1/2

USSR

AVRAMENKO, M. I., GLUKHIKH, V. A., GUSEV, O. A., KOMAR, YE. G., KOMAROV, O. L., KUZNETSOV, V. S. and SVIN'IN, M. P., DOKLADY VSESOYUZNOGO SOVESHCHANIYA PO INZHENERNYM PROBLEMAH UPRAVLYAYEMOGO TERMOYADERNOGO SINTEZA, Vol 2, 1975 pp 106-116

required magnetic fields, and an investigation is also made of the influence that the "breakdown" effect of the rising magnetic field has on motion of the beam electrons. Results found in the one-particle adiabatic approximation are compared with those obtained by the method of numerical integration of the equations of motion.

2/2

PEREVODCHIKOV, V. I.

ELECTRON-BEAM DIODES (COMMUTATORS) UTILIZING THE PRINCIPLE OF RECUPERATION OF ELECTRON BEAM ENERGY

Leningrad DOKLADY VSESOYUZNOGO SOVESHCHANIYA PO INZHENERNYM PROBLEMAH UPRAVLYAYEMOGO TERMOYADERNOGO SINTEZA [Reports of the All-Union Conference on Engineering Problems of Controlled Thermonuclear Fusion] in Russian Vol 2, 1975 pp 160-169

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V440 by Ye. G. Krastelev]

[Text] The author examines the fundamental idea and also discusses basic ways of realizing electron-beam diodes with recuperation of the energy of an electron beam. The proposed arrangement for a high-vacuum electron commutating device has high efficiency (up to 99%), which can be reached at conversion powers of tens and hundreds of megawatts, high speed and high electric strength. The basic difficulties in creation of such devices involve the development of systems for shaping high-perveance electron beams, and also effective decelerating methods. Estimates are given of the basic

1/2

USSR

PEREVODCHIKOV, V. I., DOKLADY VSESOYUZNOGO SOVESHCHANIYA PO INZHENERNYM PROBLEMAH UPRAVLYAYEMOGO TERMOYADERNOGO SINTEZA, Vol 2, 1975 pp 160-169

requirements to be met by these systems. The paper presents the parameters of an experimental model of a device with cw commutating power of 1 MW designed for a voltage of up to 100 kV. The measured efficiency of this diode is above 97-98%. Possible fields of application are briefly discussed. It is noted that commutators are now being developed with cw power of 5 MW for a voltage of 100 kV, and also devices with working voltage up to 400-500 kV and current above 10 A.

2/2

USSR

UDC 539.1.08

SAKSAGANSKIY, G. L., SEREBRENNIKOV, D. V. and IZOTOV, YE. N.

A DEVICE FOR ABSORPTION OF FAST PARTICLES

USSR AUTHOR'S CERTIFICATE No 430805, Division H, filed 5 Feb 73, published 4 Sep 75

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V441P by Ye. G. Krastelev]

[Text] This Author's Certificate introduces a device for absorption of fast neutral and charged particles. In comparison with conventional models, the proposed device has higher absorption of particles with energy of 10-100 keV. To achieve this, the absorber plates (made from metal with an injection factor close to unity) are rotating concentric conical rings placed one behind the other in such a way as to ensure uniform saturation of the plate with gas in the azimuthal plane. The proposed device can be used in high-current ion accelerators and installations for thermonuclear research.

1/1

USSR

UDC 539.1.08

DERENDYAYEV, YU. S., IVANOV, I. N., KAMINSKAYA, A. M., KAMINSKIY, A. K., KUZNETSOV, A. B., RASHEVSKIY, V. P., SARANTSEV, V. P. and SVETOV, L. V.

CALCULATION OF THE MAGNETIC SYSTEM OF AN ADHERER (3)

Dubna RASCHET MAGNITNOY SISTEMY ADGEZATORA (3) in Russian, Joint Institute of Nuclear Research, Report R9-9140, 1975, 20 pp, mimeo.

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V443 (résumé)]

[Text] The paper gives the calculation of a magnetic system for an adherer that flattens an electron tube and shape a magnetic field with rigid requirements for uniformity in the region where the tube is coupled out (preceding the accelerating system). The magnetic field was set up by multiple-turn coils located inside the adherer chamber. Shaping of the field in the extraction section was done with consideration of the fields of the solenoid and shielding of the fields by the chamber. The authors give results of consideration of the influence that an infinite ideally conductive tube with radius smaller than that of the electron tube has on field distribution in the extraction region.

1/1

USSR

UDC 539.1.08

SHVETS, V. A.

FORMATION OF PULSES FOR MONOCHROMATIZING THE ELECTRON BEAM OF A PULSED LINAC

Dubna FORMIROVANIYE IMPUL'SOV MONOKHROMATIZATSII ELEKTRONNOGO PUCHKA LIU in Russian, Joint Institute of Nuclear Research, Report 13-9077, 1975, 13 pp, mimeo.

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V448 (résumé)]

[Text] The paper gives the results of work on development of a two-channel system for monochromatizing the electron beam of a pulsed linac. The author describes the design worked out for a low-resistance accumulator of energy of microsecond duration and a circuit for shaping monochromatizing current pulses with amplitude up to 1 kA having nanosecond rise time and cutoff.

1/1

USSR

UDC 539.1.08

BOMKO, V. A. and RUDYAK, B. I.

ACCELERATING SYSTEM FOR AN ION LINAC

USSR AUTHOR'S CERTIFICATE No 434900, Division H, filed 29 Oct 70, published 25 Apr 75

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V453P by G. O. Meskhi]

[Text] In existing linacs that are made in the form of a resonator with drift tubes, stabilizing elements are used in a number equal to the number of drift tubes. This complicates the alignment process when one considers that the number of drift tubes in modern accelerator sections is greater than 100. It is proposed that stabilizing elements be used that are located on the generatrix of the resonator diametrically opposite the generatrix on which the drift tube hangers are set. The stabilizing elements are made in the form of conductive rods with effective length corresponding to an odd number of quarter wavelengths of the accelerator. The maximum stabilizing effect is attained when the fields of the elements of stabilization are maximally coupled with the fields of interfering wave modes and minimally

1/2

USSR

BOMKO, V. A. and RUDYAK, B. I., USSR AUTHOR'S CERTIFICATE No 434900

coupled with the field of the working wave. Since the field distribution of the working wave is influenced most by modes with frequency closest to that of the working wave, a stabilizing effect is achieved with a small number of stabilizing elements.

2/2

USSR

ANGELOV, N., VISHNEVSKAYA, K. P., GRISHIN, V. G., DZHMUKHADZE, S. V., DIDENKO, L. A., IVANOVSKAYA, I. A., INOGAMOVA, T. YA., KANAREK, T., Kladnitskaya, YE. N., LYUBIMOV, V. B., MEL'NIKOVA, N. N., POPOVA, V. M., SABEU, M., SEMERDZHIYEV, KH., SOLOV'YEV, M. I., SOLOMIN, A. N., SUD, P. M., TUVDENDORZH, D., FADEYEV, N. G., TSIVTSIVADZE, E. T., SHCHEGLOVA, L. M., YANCHO, G., Joint Institute of Nuclear Research, Dubna, AKHABABYAN, N. O., GREKOVA, L. D., IKOV, N. P., PENEV, V. N., SHKLOVSKAYA, A. I., Institute of Nuclear Research and Nuclear Power Engineering, Sofia, ABESALASHVILI, L. N., AMAGLOBELI, N. S., AKHOBADZE, P. T., GERSAMIYA, D. V., DASAYEVA, M. A., KVACHADZE, T. I., KUTSIDI, N. K., SALUKVADZE, R. G., TEVZADZE, YU. V. and CHARGEYSHVILI, M. S., Tbilisi State University

INVESTIGATION OF π^-n AND $\pi^{-12}C$ INTERACTIONS WITH PARTICIPATION OF STRANGE PARTICLES AT $p = 40$ GeV/c

Moscow YADERNAYA FIZIKA in Russian Vol 24, No 4(10), Oct 76 pp 732-741 manuscript received 21 Oct 75

[Russian abstract provided by the source]

[Text] Inclusion and semi-inclusion production cross sections are determined for Λ and K^0 particles in π^-n and $\pi^{-12}C$ interactions at 40 GeV/c. No

1/2

USSR

ANGELOV, N., VISHNEVSKAYA, K. P. et al., YADERNAYA FIZIKA, Vol 24, No 4(10), Oct 76 pp 732-741

correlation is observed between the average number of Λ hyperons and the number of charged particles in π^-n and $\pi^-^{12}\text{C}$ events, nor between $\langle n_{K^0} \rangle$ and n in π^-n events. For $\pi^-^{12}\text{C}$ interactions a tendency toward an increase in $\langle n_{K^0} \rangle$ is observed with increasing n . In $\pi^-^{12}\text{C}$ interactions as many Λ and K^0 particles are produced on the average as in interactions between π^- mesons and nucleons. References 19: 11 Russian, 8 Western.

2/2

USSR

ALESHIN, YU. D., ARUTYUNYAN, G. A., KISELEVICH, I. D., KULAKOV, V. P., MEL'NICHENKO, I. A., NIKITIN, S. YA., SILAYEV, V. I., SHVARTSMAN, B. F., SHIDLOVSKIY, A. V. and SHKARLET, V. D., Institute of Theoretical and Experimental Physics, State Committee on the Utilization of Atomic Energy

INVESTIGATION OF THE PRODUCTION OF N^* RESONANCES IN THE REACTIONS $\pi^-p \rightarrow \Lambda K^+ + X^-$ AND $\pi^-p \rightarrow \Lambda K^0 + X^0$ AT MOMENTA OF 4.35 AND 4.85 GeV/c

Moscow YADERNAYA FIZIKA in Russian Vol 24, No 4(10), Oct 76 pp 742-747 manuscript received 27 Oct 75

[Russian abstract provided by the source]

[Text] An investigation was made of the mass spectra of the particle system $\Lambda K^{+,0}$ in the reactions $\pi^-p \rightarrow \Lambda K^+ + X^-$ and $\pi^-p \rightarrow \Lambda K^0 + X^0$ at momenta of 4.35 and 4.85 GeV/c. The production cross section is determined for the isobar $N^* \rightarrow \Lambda K$ (mass $M = 1717 \pm 39$ MeV, width $\Gamma = 136$ MeV), as well as the possible value of the isobar spin $J \geq \frac{5}{2}$. References 6: 3 Russian, 3 Western.

1/1

USSR

BIRULEV, V. K., GENCHEV, V. I., GOVORUN, N. N., GRIGALASHVILI, T. S., GUS'-KOV, B. N., GLADKI, YA., IVANCHENKO, I. M., KEKELIDZE, V. D., KISH, D., KRIVOKHIZHIN, V. G., KUKHTIN, V. V., LIKHACHYOV, M. F., NAD', E., NOVAK, M., PROKESH, A., SALOMATIN, YU. I., SAVIN, I. A., SIL'VESTROV, L. V., SIMONOV, V. YE., SMOLIN, D. A., TAKHTAMYSHEV, G. G., TODOROV, P. T., URBAN, L., VOVENKO, A. S., VESTERGOMBI, G. and VOTRUBA, YA., Budapest, Dubna, Prague, Serpukhov, Sofia

TRANSMISSION REGENERATION OF NEUTRAL K-MESONS ON HYDROGEN

Moscow YADERNAYA FIZIKA in Russian Vol 24, No 4(10), Oct 76 pp 748-761 manuscript received 26 Jan 76

[Russian abstract provided by the source]

[Text] The energy dependence of modulus and phase of the amplitude of transmission regeneration of $K_L^0-K_S^0$ on hydrogen was studied in the 14-50 GeV region in experiments done on the 70 GeV accelerator of the High-Energy Physics Institute at Serpukhov. It is shown that the modulus of the modified amplitude of regeneration decreases with an increase in momentum in accordance with the law $2|f_{21}^0(p)|/k = (0.84 \pm 0.42)p^{-0.50 \pm 0.15}$ mb, while the phase of the

1/2

USSR

BIRULEV, V. K., GENCHEV, V. I. et al., YADERNAYA FIZIKA, Vol 24, No 4(10), Oct 76 pp 748-761

amplitude is independent of momentum and averages $\phi_{21}^0 = -132 \pm 5^\circ$. The results are compared with those of other experiments, and also with the predictions of different theoretical models. References 45: 24 Russian, 1 Czech, 20 Western.

2/2

USSR

PLUTA, J. and STRUGALSKI, Z., Institute of Physics, Warsaw Technical University

ON THE PROBLEM OF INTERACTION OF HIGH-ENERGY PARTICLES WITH ATOMIC NUCLEI

Moscow YADERNAYA FIZIKA in Russian Vol 24, No 4(10), Oct 76 pp 766-771
manuscript received 21 Oct 75

[Abstract] The authors analyze the results of an experimental study of the process of interaction between high-energy pions and atomic nuclei of xenon. The characteristics of π^0 mesons and protons from π Xe interactions at energies of 2.34-10 GeV are compared with predictions of the intranuclear cascade model. This comparison shows considerable discrepancies regarding multiple production of π^0 mesons. The characteristics of π^0 meson multiplicities agree with a phenomenological model of π N interactions. The dependence of the energy and angular characteristics of the protons on their multiplicity does not agree with the predictions of the intranuclear cascade model. However, the angular distributions of π^0 mesons and protons agree with the predictions of this model. These results imply that despite the observed influence of intranuclear processes on the kinematic characteristics of products resulting from reactions of pions with a nucleus, there is no

1/2

USSR

PLUTA, J. and STRUGAL'SKI, Z., YADERNAYA FIZIKA, Vol 24, No 4(10), Oct 76 pp 766-771

observable effect of secondary interactions on the generation or absorption of π^0 mesons. The parameters of multiplicity distribution of π^0 mesons apparently agree with the assumption that π^0 mesons are produced in a single quasi-elementary act of interaction, after which neither secondary emission or absorption of the particles occurs with appreciable probability. References 12: 7 Russian, 1 Polish, 4 Western.

2/2

USSR

UDC 539.1.08

TEPLYAKOV, V. A.

A METHOD OF STABILIZING THE AMPLITUDE AND PHASE OF A HIGH-FREQUENCY FIELD IN ACCELERATOR RESONATORS

USSR AUTHOR'S CERTIFICATE No 434899, Division H, filed 29 May 72, published 25 Apr 75

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V454P by G. O. Meskhi]

[Text] A method is proposed for stabilizing the amplitude and phase of the voltage in accelerator resonators under beam loading. A master oscillator is used with stable voltage amplitude and phase; the oscillator power is fed through a first double T-bridge to an oscillator with stable amplification factor, and then through a second T-bridge to the resonators of the accelerator which have identical (zero) reflectance without the beam, and variable reflectance with beam loading. For reflectances different from zero the power is fed by the second T-bridge via an attenuator to the first T-bridge, and is added to the master oscillator power. The amplification factor and length of the coupling line in the attenuator circuit are such that the voltage

1/2

USSR

TEPLYAKOV, V. A., USSR AUTHOR'S CERTIFICATE No 434899

amplitude and phase in the resonators are independent of the load and are controlled only by the change in working conditions of the master oscillator. The proposed system is linear within the accuracy of constant gain and is inertialess, since delay is appreciably less than the time constant of the resonator.

2/2

USSR

UDC 539.1.08

VASIL'YEV, S. N., GUSEV, O. A., KOFMAN, V. M. and FYODOROV, V. D.

POWER SUPPLY SYSTEM FOR SUPERCONDUCTIVE ELECTROMAGNETS IN A 2-TeV ACCELERATOR-ACCUMULATOR COMPLEX

Moscow TRUDY CHETVERTOGO VSESOYUZNOGO SOVESHCHANIYA PO USKORITELYAM ZARYA-ZHENNYKH CHASTITS, 1974 [Transactions of the Fourth All-Union Conference on Charged Particle Accelerators, 1974] in Russian Vol 2, "Nauka," 1975 pp 118-121

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V475 by Ye. G. Krastelev]

[Text] An examination is made of the design particulars of the power supply system for superconductive magnet elements in a 2000 GeV two-stage accelerator-accumulator complex. The system is to ensure formation of predetermined excitation cycles with magnetic field regulation accuracy on flat sections of the pulse within $\approx 10^{-4}$ with coefficient of pulsations not exceeding $5 \cdot 10^{-3}$. Peak power is ≈ 32 MVA. An analysis is made of possible modifications of the design of the system. It is shown that the most suitable of these is a version with synchronized power supply on a base thyristor converter. Problems of emergency protection of the magnets and control system are considered.
1/1

USSR

UDC 539.1.08

SIDORIN, V. P., KHVOSTOV, V. B. and SHUMOV, S. A.

ANGULAR DISTRIBUTION OF CHARGED PARTICLES OF THE FOREMAGNET IN THE SYNCHROPHASOTRON OF THE JOINT INSTITUTE OF NUCLEAR RESEARCH

Moscow VOPROSY DOZIMETRII I ZASHCHITY OT IZLUCHENIYA [Problems of Dosimetry and Radiation Protection, Collection of Works] in Russian No 14, Atomizdat, 1975 pp 56-58

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V481 by A. V. Agafonov]

[Text] An investigation is made of the angular distribution of secondary charged particles formed with interaction of protons and neutrons having momenta of 10 and 8.3 GeV/c with the septum of the foremagnet of slow extraction on the synchrophasotron of the Joint Institute of Nuclear Research. The particles were recorded by a telescopic system of three scintillation counters spaced 35 cm apart. A mechanical system was used to set the counters at different angles. The angular resolution of the telescopic system was determined by the distance to the center of the septum and by the dimensions of the scintillators, and amounted to $\pm 5^\circ$ in the experiment. The system recorded

USSR

SIDORIN, V. P., KHVOSTOV, V. B. and SHUMOV, S. A., VOPROSY DOZIMETRII I ZASHCHITY OT IZLUCHENIYA, No 14, Atomizdat, 1975 pp 56-58

chiefly protons, pions and muons with energy threshold of 80, 35 and 30 MeV respectively. The paper gives the angular distribution of secondary charged particles. The resultant dependence is compared with an empirical formula proposed by the authors. Approximation coefficients are found for the empirical formula.

2/2

USSR

UDC 621.039.5

ILIYEVA, K. D. and STEPANOV, A. V.

ON THE THEORY OF THERMAL NEUTRON DIFFUSION IN A MEDIUM WITH RANDOM INHOMOGENEITIES. A MODERATOR WITH CHAOTICALLY DISTRIBUTED 'BLACK BALLS'

N. p. OPYT EKSPLOATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA B-V) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter B-C), Collection of Works] in Russian, n. d., pp 939-955

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V742 (résumé)]

[Text] An examination is made of diffusion of thermal neutrons in a medium with random inhomogeneities. Neutron transport is described in such a medium in terms of the average (macroscopic) flux. In the case of low concentration of inhomogeneities an equation is derived for damping constants of the average neutron flux in space. In this connection the effective diffusion characteristics of the medium (coefficient of diffusion and macroscopic absorption cross section) are expressed in terms of the perturbation of the neutron field caused by an individual inhomogeneity. In the most interesting case of chaotically distributed "black" absorbers it is shown that heterogeneity mainly influences the effective absorption cross section.

1/1

ILIYEVA, K. D. and KAZARNOVSKIY, M. V.

ON THE THEORY OF UNSTEADY TRANSPORT OF THERMAL NEUTRONS IN A MODERATOR THAT CONTAINS A LARGE SPHERICAL CAVITY. ACCOUNTING FOR FINITENESS OF THE RADIUS OF THE CAVITY AND FINITENESS OF THE TIME THAT NEUTRONS REMAIN IN THE MODERATOR

N. p. OPYT EKSPLOATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA B-V) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter B-C), Collection of Works] in Russian, n. d., pp 956-965

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V743 (résumé)]

[Text] Previously (RZh-Fiz, 1974, 3V420) the authors examined transport of thermal neutrons from a pulse source in a spherical moderator block containing a large spherical cavity (length of diffusion L much greater than the radius of the cavity R). Assuming that the average time of random movement of the neutrons in the moderator is much less than the time of flight through the cavity, and that the spectrum of the neutrons escaping from the moderator into the cavity is independent of the spectrum of the incident neutrons, it was shown that the total neutron flux damps out

1/2

USSR

ILIYEVA, K. D. and KAZARNOVSKIY, M. V., OPYT EKSPLOATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA B-V), n. d., pp 956-965

quasiexponentially over a wide range of time after a neutron flare. This paper extends the field of application of the results (i. e. for an arbitrary L/R ratio). A correction for the damping constant is found that accounts for the finiteness of the time of random motion of neutrons in the moderator and finiteness of the cavity radius.

2/2

USSR

UDC 621.039.5

LELEKOV, V. I.

ON THE PROBLEM OF METHODS OF CALCULATING THE COMPLEX CHARACTERISTICS OF SYSTEMS WITH ROTATING COMPENSATING CYLINDERS LOCATED IN A RADIAL REFLECTOR

Moscow VOPROSY ATOMNOY NAUKI I TEKHNIKI. SERIYA: YADERNAYA FIZIKA NIZKOY I SREDNEY ENERGII, REAKTORNAYA FIZIKA [Problems of Atomic Science and Technology. Series on Low-Energy and Medium-Energy Nuclear Physics and Reactor Physics, Collection of Works] in Russian No 4, 1975 pp 65-70

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V766 (résumé)]

[Text] The author compares the results of applying various techniques to calculation of experimental data on investigation of the characteristics of systems with rotating compensating cylinders located in a radial reflector in a physical model of a small-scale reactor installation.

1/1

USSR

UDC 621.039.5

PAVELESKU, M., DUMITRESKU, K. and GILEA, S.

GAME-THEORY OPTIMIZATION OF A THERMAL RESEARCH REACTOR WITH GLAZED CERAMIC FUEL

N. p. OPYT EKSPLOATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA A) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter A), Collection of Works] in Russian, n. d., pp 506-510

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V768 (résumé)]

[Text] An investigation is made of a zero-power thermal heavy-water reactor with glazed ceramic fuel elements of honeycomb type with natural uranium. By examining the variation in radius R and critical mass M with grid spacing p and fuel element radius $[r]$ it can be shown that these two parameters are minimized for different (p, r) pairs. The problem as here formulated consists in finding the position at which both R and M take on their minimum possible values. Considering that the variation of these parameters is usually opposed in a certain field of pairs (p, r) , the structure of the problem is that of a two-person game with non-zero sum. The solution is found by specific means leading in the final analysis to the (p, r) pair for which the radius and critical mass have the optimum values.

1/1

USSR

ANTONOV, A. V., GALKIN, O. F., GUREY, A. YE., ISAKOV, A. I., KOVYL'NIKOV, V. N., MIKEROV, V. I. and TIKHOMIROV, A. A., Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR

A PORTABLE NEUTRON STORAGE INSTALLATION FOR A PULSED REACTOR

Moscow PIS'MA V ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI in Russian Vol 24, No 26, 20 Sep 76 pp 387-390 manuscript received 19 Aug 76

[Abstract] The paper describes experiments on accumulation of ultracold neutron gas on a single-action pulsed reactor. The neutron trap is an electrically insulated copper vessel 40 cm in diameter and 40 cm high with a special set of shutters in the top and two openings in the bottom with provision for covering by filters. A track detector is placed beneath one of these openings, and a gas scintillator is located under the other, with efficiencies of ultracold neutron registration of 50 and 25% respectively. The radiator in the detectors is a uranium-titanium layer. Both detectors are practically insensitive to beta and gamma rays and have low efficiency for thermal neutrons. The source of ultracold neutrons is a polyethylene converter above the shutter arrangement that is cooled to nitrogen temperatures. Above the converter is a polyethylene neutron moderator. In the

1/2

USSR

ANTONOV, A. V., GALKIN, O. F., GUREY, A. YE., ISAKOV, A. I., KOVYL'NIKOV, V. N., MIKEROV, V. I. and TIKHOMIROV, A. A., PIS'MA V ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI, Vol 24, No 26, 20 Sep 76 pp 387-390

described experiments the density of the stored neutron gas was of the same order as that attained in a high-flux stationary reactor. The level of the neutron background was exceptionally low. Steps can be taken to increase the number of stored neutrons to $\sim 2 \cdot 10^5$, and to raise the density of the neutron gas to $\sim 10^4 \text{ l}^{-1}$. References 7 Russian.

2/2

USSR

VAYNSHTEYN, A. I., ZAKHAROV, V. I., NOVIKOV, V. A. and SHIFMAN, M. A., Institute of Theoretical and Experimental Physics

DEEPLY INELASTIC SCATTERING OF LEPTONS BY HADRONS, AND BREMSSTRAHLUNG OF GLUONS

Moscow PIS'MA V ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI in Russian Vol 24, No 26, 20 Sep 76 pp 376-379 manuscript received 3 Aug 76

[Russian abstract provided by the source]

[Text] A valence quark model is proposed to describe deeply elastic scattering of leptons by hadrons within the framework of asymptotically free theories of strong interactions. Gluons are formed only as a result of bremsstrahlung of quarks, and are not present in the initial state. The model satisfactorily describes available data, and enables formulation of further predictions. References 4 Russian.

1/1

USSR

UDC. 621.039.5

PESEREANU, N., CHIKI, I., BOYERIU, SH., CHEPRAGA, D., CHIMPORESKU, D., KYRSTOYU, B. and KRISTIAN, I.

A MODEL CHAIN CODE FOR CALCULATING PERTURBATIONS IN REACTORS ON NATURAL URANIUM AND HEAVY WATER

N. p. OPYT EKSPLOATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA A) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter A), Collection of Works] in Russian, n. d., pp 511-516

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V771 (résumé)]

[Text] The paper presents a calculation chain that is a component part of a model system of codes. The chain consists of a code for generation of neutron parameters in a complex cell, a unidimensional multigroup diffusion code, and a code for calculating neutron lifetime and reactivity. The theory of one-dimensional perturbations is used.

1/1

KUKULEANU, V., MOCHOYU, D., APOSTOL, YE., DRUTSE, YE., KONSTANTINESKU, D.

A COMPUTER PROGRAM FOR THE NEUTRON PARAMETERS OF A FAST REACTOR CELL

N. p. OPYT EKSPLOATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA A) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter A), Collection of Works] in Russian, n. d., pp 517-523

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V772 (résumé)]

[Text] A program is presented for solution of the Boltzmann equation that describes the equilibrium spectrum of neutrons in any fast reactor lattice (critical square lattice with two zones -- fuel and diluent). The method of first-collision probabilities is used for the solution. An algorithm of iteration on a fission source is used. The main lattice parameters, averaged effective cross sections of each isotope on different lattice spectra and heterogeneous macroscopic effective cross sections are calculated by means of a code.

1/1

NAZAROV, A. I., FRUNZE, V. V. and SHUSHKANOVA, V. P.

ON A TECHNIQUE FOR DETERMINING RADIOACTIVITY DUE TO FISSION FRAGMENTS IN THE BRICKWORK OF A PULSE REACTOR

Moscow VOPROSY ATOMNOY NAUKI I TEKHNIKI. SERIYA: YADERNYYE KONSTANTY [Problems of Atomic Science and Technology. Series on Nuclear Constants, Collection of Works] in Russian No 20, part 2, Atomizdat, pp 198-210

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V814 by the authors]

[Text] An analytical expression is found for the integral radioactivity of fission products as a function of time for the case of ^{235}U fission by thermal neutrons. This expression enables one to determine the radioactivity of fission products in the course of operation of a pulse reactor. In view of the insignificant difference between data on radioactivity with fission of uranium by thermal neutrons and by fission spectrum neutrons, the technique can be successfully used in evaluating the integral radioactivity of the loop when ^{235}U is fissioned in the pulse mode for energy purposes, and in particular in the Winterberg system.

1/1

USSR

UDC 621.039.5

VARKONI, L., FRANKL, L., GODA, L., VIZDOSH, G., TOT, M. and BALOT, SH.

SEVEN YEARS OF OPERATING EXPERIENCE ON THE BUDAPEST UPDATED VVR-SM REACTOR

N. p. OPYT EKSPLUATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA A) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter A), Collection of Works] in Russian, n. d., pp 58-95

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V822 (résumé)]

[Text] Modernization of the reactor is briefly outlined. A detailed analysis is done on the seven years of experience accumulated since modernization, including examination of operating problems, core configurations, fuel economy, technological systems of control rods and instrumentation, and radiation monitoring. Finally, fields of application of the reactor as a neutron source are indicated.

1/1

USSR

UDC 621.039.5

PANDEV, I., KHRISTOV, KH., STEFANOV, S., KHRISTOVA, M., MILEV, P., SEMOV, M. and DESPOTOV, V.

OPERATING EXPERIENCE WITH THE SOFIA IRT-2000 REACTOR, AND IMPROVEMENT OF ITS WORKING CAPABILITIES

N. p. OPYT EKSPLUATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA A) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter A), Collection of Works] in Russian, n. d., pp 176-198

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V823 (résumé)]

[Text] The paper gives data on operation of the research reactor in Sofia, as well as information on changes made in the reactor after 1963.

1/1

KORNEYEV, V. T., CHERNYSHEVICH, V. N. and YASHIN, A. F.

INVESTIGATION OF SOME THERMAL AND PHYSICAL CHARACTERISTICS OF THE IRT-M REACTOR

N. p. OPYT EKSPLUATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA A) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter A), Collection of Works] in Russian, n. d., pp 205-235

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V824 (résumé)]

[Text] The paper gives the results of experiments for critical and working loads of the IRT-M reactor after updating, and data on the flux distribution of fast and thermal neutrons in the core. A description is given of the results of measurements of the heat conditions for operation of fuel assemblies with natural convection and forced coolant circulation. Data are given on heat conditions with operation on a power of 8 MW.

1/1

TSYKANOV, V. A., AVER'YANOV, P. G., BURUKIN, V. P., ZVEREV, V. A., KLOCH-KOV, YE. P., KORMUSHKIN, YU. P., KUZOVNIKOV, A. S. and MATVEYEV, N. P.

IMPROVEMENT OF THE IN-PILE LOOP AND EXPANSION OF THE EXPERIMENTAL CAPABILITIES OF THE SM-2 RESEARCH REACTOR

N. p. OPYT EKSPLUATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA A) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter A), Collection of Works] in Russian, n. d., pp 236-242

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V825 (résumé)]

[Text] The paper gives the results of the main improvements made in the SM-2 reactor in 1971-1974. Data are given on updating of the heat-exchange equipment of the in-pile loop that increased the reactor power from 75 to 100 MW. Information is given on the main thermophysical characteristics of the 100 MW reactor.

1/1

USSR

UDC 621.039.5

SABO, F., VARKONI, L., FRANKL, L., VIZDOSH, G., TOT, M., BALOG, SH., PALLAGI, D. and TSIKO, R.

RECONSTRUCTION OF THE BUDAPEST VVR-S RESEARCH REACTOR

N. p. OPYT EKSPLOATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA A) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter A), Collection of Works] in Russian, n. d., pp 442-473

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V829 (résumé)]

[Text] Justification is given for the necessity and purpose of reconstruction of the Budapest VVR-S reactor. A brief description is given of the working configuration of the core on the ZR-3 critical assembly. Details are presented on the basic engineering work carried out in the reconstruction, and the measurements made after starting the reconstructed reactor.

1/1

USSR

UDC 621.039.5

SUVAL'SKI, V.

INVESTIGATION OF PROPERTIES OF THE 'MARIA' HIGH-FLUX REACTOR ON ITS PHYSICAL MODEL. PART I: PURPOSE OF THE RESEARCH, CONSTRUCTION OF THE PHYSICAL MODEL, INVESTIGATION OF CHARGING

N. p. OPYT EKSPLOATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA A) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter A), Collection of Works] in Russian, n. d., pp 591-607

[From REFERATIVNYY ZHURNAL, FIZIKA, No 7, 1976 Abstract No 7V831 (résumé)]

[Text] In order to determine the parameters of the "Maria" reactor (Poland) and to shorten the start-up period, a critical assembly (physical model) of the reactor was constructed. Part I describes the main features of the design of the critical assembly and the measurement program. Recorder charts are given from research on charges, and their principal characteristics are presented.

1/1

BUTKEVICH, YU., YUZEFOVICH, E. T., SHMEK, V.

INVESTIGATION OF PROPERTIES OF THE 'MARIA' HIGH-FLUX REACTOR ON ITS PHYSICAL MODEL. PART II: SPATIAL-ENERGY DISTRIBUTION OF NEUTRON FLUXES IN THE CORES

N. p. OPYT EKSPLOATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA A) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter A), Collection of Works] in Russian, n. d., pp 608-622

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V832 (résumé)]

[Text] The second part investigates some of the configurations of the core, including "pure" critical masses with and without an external lateral reflector, and also cores poisoned by absorbers. Measurements are made of the macrodistributions of neutron flux with respect to the principal axes of the assembly and in the plane of the horizontal central cross section in the thermal, epithermal and fast groups. The angular distribution of neutron flux on the surface of the fuel assembly, the microdistribution of the heat flux in an elementary cell and the spectral indices are measured in certain characteristic positions. The results are compared with available calculations.

1/1

BEDNARSKI, Z. S.

INVESTIGATION OF PROPERTIES OF THE 'MARIA' HIGH-FLUX REACTOR ON ITS PHYSICAL MODEL. PART III: PARAMETERS OF NEUTRON BEAMS EXTRACTED FROM THE HORIZONTAL CHANNELS

N. p. OPYT EKSPLOATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA A) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter A), Collection of Works] in Russian, n. d., pp 623-636

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V833 (résumé)]

[Text] The critical assembly is equipped with simulated horizontal (radial and tangential) experimental channels. Measurements are made of the following characteristics of neutron beams coupled out of these channels: relative intensity; cadmium ratio for boron counters; relative flux of gamma rays as a function of the position of the beginning of the channel with respect to the core, the kind of scattering medium (H_2O , D_2O , Be, C) and its thickness. The data are intended for optimum final design of the channels.

USSR

UDC 621.039.5

GLOVATSKI, S.

SOME NEW MEASUREMENT LINES IN THE CONTROL SYSTEM OF THE VVR-SM REACTOR

N. p. OPYT EKSPLOATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA A) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter A), Collection of Works] in Russian, n. d., pp 896-701

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V836 (résumé)]

[Text] The paper describes new technological systems for monitoring and control in the EWA reactor (Swierk, Poland): the start-up measurement channel of the reactor; the counter for thermal energy output of the reactor; instrumentation for measuring thermal power of the reactor; a system for stabilizing neutron power of the reactor.

1/1

USSR

UDC 621.039.5

FENIKE, S. and SHTEFENESKU, P.

A MONITORING SIGNAL SYSTEM FOR A RESEARCH REACTOR

N. p. OPYT EKSPLOATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA A) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter A), Collection of Works] in Russian, n. d., pp 798-808

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V840 (résumé)]

[Text] A safety monitoring signal system is proposed for a research reactor with power of 10^3 - 10^6 W. The circuit is based completely on logic IC's, eliminating dynamic switching (relays); the drive for motors or (for example) the drive for visual signals is based on thyristor circuits. The circuits are made in such a way that they are readily adaptable to equipment of the VVR-S type. The paper also gives a modification of the system that is designed for monitoring and measurements on thyristorized equipment.

1/1

KMOSHENA, YU., PAULICHKA, I. and RANA, SH. B.

PHYSICS EXPERIMENTS ON THE KS-150 REACTOR

N. p. OPYT EKSPLOATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA B-V) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter B-C), Collection of Works] in Russian, n. d., pp 873-886

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V844 (résumé)]

[Text] The paper describes experimental conditions and lists experiments on physical start-up of the KS-150 reactor as well as giving important results. Physics experiments done on the power reactor are listed with reasons for doing them. Depending on the method of compensation of excess reactivity during the initial stage of operation, a field of thermal neutrons was formed in the reactor core. The authors show the necessity for continuous measurement of the neutron flux within the core, and describe the conditions and results of intracore measurements. A technique is described for calibrating the control rods of the power reactor by using a transient process (poisoning with xenon and samarium) in the course of power variations. The experimental results are evaluated.

1/1

PELCHIK, YE. and ERBEN, O.

RESULTS AND EXPERIENCE FROM RADIATION EXPERIMENTS ON THE HIGH-PRESSURE GAS LOOP OF A VVR-S REACTOR

N. p. OPYT EKSPLOATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA B-V) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter B-C), Collection of Works] in Russian, n. d., pp 1029-1046

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V847 (résumé)]

[Text] The paper presents the history of development of the gas loop on a VVR-S reactor. Descriptions are given of experimental equipment and basic experiments done on the gas loop over the last ten years. Experimental results are briefly described.

USSR

UDC 621.039.5

LUNGU, S., REDULESKU, O., GLANZ, G. and RUTTER, I.

MULTICHANNEL HELIUM-COOLED LOOP IN A VVR-S REACTOR

N. p. OPYT EKSPLOATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA B-V) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter B-C), Collection of Works] in Russian, n. d., pp 1098-1102

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V849 (résumé)]

[Text] Conditions are given for experimentation on a VVR-S reactor with helium-cooled loop (pressure in the loop 20 kg/cm^2 , mass flowrate $15 \text{ g/cm}^2 \cdot \text{s}$ for a hydraulic section measuring 0.2 cm^2 in cross sectional area) for investigation of mechanical stresses that show up in pencil-type nuclear glazed ceramic fuel under transient loads. The design of the loop and safety measures are described.

1/1

USSR

UDC 621.039.5

KORMUSHKIN, YU. P. and SAMSONOV, V. B.

TRENDS IN THE DEVELOPMENT OF HIGH-FLUX RESEARCH REACTORS IN THE USSR

N. p. OPYT EKSPLOATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV. SIMPOZIUM, PREDEAL, 1974 (TEMATIKA B-V) [Experience in Operating and Using Research Reactors. Symposium, Predeal, 1974 (Subject Matter B-C), Collection of Works] in Russian, n. d., pp 1195-1203

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7V851 (résumé)]

[Text] Brief information is given on operation of the SM-2 reactor and its use for doing different kinds of research. A report is given on the most recent changes in the reactor systems and on bringing it up to a power of 100 MW. An examination is made of trends in development of Soviet research reactors with high neutron flux density.

1/1

USSR

UDC 621.039.5

FILIPYAK, B. and MLITSKI, K.

OPERATIONAL EXPERIENCE IN WORKING WITH THE NEW RADIATION MONITORING SYSTEM
OF THE EWA-10 VVRS-M REACTOR

N. p. OPYT EKSPLOATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV.
SIMPOZIUM, PREDEAL, 1974 (TEMATIKA A) [Experience in Operating and Using
Research Reactors. Symposium, Predeal, 1974 (Subject Matter A), Collection
of Works] in Russian, n. d., pp 702-706

[From REFERATIVNYY ZHURNAL, FIZIKA, No 7, 1976 Abstract No 7V916 (résumé)]

[Text] The new radiation monitoring system is described. A functional and
technical analysis is made of the elements of the new system with particular
regard to experience over the operational period. Attention is focused on
differences between the old and new radiation monitoring systems, in particular
in measurement channels of a technological nature.

1/1

USSR

UDC 621.039.5

AVER'YANOV, G. P., GAFAROV, R. L., ZHELEZNYI, V. M., ZVEREV, V. A., KARASEV,
A. D., KLOCHKOV, YE. P., KUPRIYENKO, V. A. and KUSOVNIKOV, A. S.

OPERATIONAL EXPERIENCE IN MIR AND SM-2 REACTORS WITH SYSTEMS FOR HANDLING,
INSPECTING AND PREPARING IRRADIATED ITEMS

N. p. OPYT EKSPLOATATSII I ISPOL'ZOVANIYA ISSLEDOVATEL'SKIKH REAKTOROV.
SIMPOZIUM, PREDEAL, 1974 (TEMATIKA A) [Experience in Operating and Using
Research Reactors. Symposium, Predeal, 1974 (Subject Matter A), Collection
of Works] in Russian, n. d., pp 427-441

[From REFERATIVNYY ZHURNAL, FIZIKA, No 7, 1976 Abstract No 7V926 (résumé)]

[Text] Systems are described for handling fuel assemblies, ampules and loop
channels in SM-2 and MIR reactors. The paper generalizes years of experience
in using these systems, and makes recommendations on further improvement.
Requirements are formulated for outfitting the hot chambers of research
reactors with devices for inspecting and preparing irradiated specimens.
Some of these facilities are described and data are given on protracted
utilization.

1/1

USSR

IVANOV, N. V., KOVAN, I. A. and SOKOLOV, YU. A., Institute of Atomic Energy
imeni I. V. Kurchatov

MAGNETOACOUSTIC HEATING OF A TWO-COMPONENT PLASMA IN THE T-4 TOKAMAK

Moscow PIS'MA V ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI in Russian
Vol 24, No 26, 20 Sep 76 pp 342-345 manuscript received 9 Aug 76

[Abstract] An experimental study is done on a magnetoacoustic method of maintaining nonmaxwellian velocity distribution of the ion component of a tokamak plasma to obtain a positive yield of thermonuclear energy. The method is based on the way that polarization of the magnetoacoustic wave depends on the frequency of oscillations and cyclotron ion frequency. In a plasma made up of two kinds of ions the magnetoacoustic wave propagating on one of the two cyclotron frequencies is elliptically polarized and should be effectively absorbed, transmitting its energy to resonant ions. This energy is given over via deceleration to nonresonant ions and electrons, forming a "tail" of the ion distribution function, and in the case of a tritium-deuterium mixture resulting in an increased thermonuclear yield. Experiments done on the T-4 tokamak confirm the feasibility of achieving a two-component working mode by cyclotron heating of admixed ions using magnetoacoustic fields. References 9: 6 Russian, 3 Western.

1/1

USSR

VDOVIN, V. L., RUSANOV, V. D. and SHAPOTKOVSKIY, N. V.

CYCLOTRON ABSORPTION OF FAST MAGNETOACOUSTIC WAVES IN THE TM-1-VCh TOKAMAK
IN THE PRESENCE OF A SMALL GROUP OF RESONANT IONS

Moscow PIS'MA V ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI in Russian
Vol 24, No 7, 5 Oct 76 pp 410-413 manuscript received 9 Aug 76

[Russian abstract provided by the source]

[Text] Strong absorption of fast magnetoacoustic waves is observed in deuterium on the second harmonic of ion-cyclotron frequency $\omega = 2\omega_{iB}$ in the TM-1-VCh tokamak. The absorption is due to a small admixture of hydrogen (~1%) for which $\omega = \omega_{Bi}$. The protons effectively take on energy from the leftward-polarized component of the electric field of fast magnetoacoustic waves, and a proton energy "tail" is formed in the distribution function, which may find application in a two-component tokamak. References 7: 4 Russian, 3 Western.

1/1

USSR

UDC 535.317.1

BELOGEROV, A. F., YEN'SHIN, A. V., ZAYTSEV, V. G., ZEYLIKOVICH, I. S. and SPORNIK, N. M.

USE OF A HOLOGRAPHIC INTERFEROMETER WITH REFERENCE WAVE FORMED FROM THE OBJECT WAVE IN A BALLISTICS EXPERIMENT

Leningrad ZHURNAL TEKHNIЧЕСКОY FIZIKI in Russian Vol 46, No 9, Sep 76
pp 1987-1989 manuscript received 25 Jul 75

[Abstract] The authors discuss two versions of a holographic attachment. They demonstrate that the first version has the advantage of lower requirements for spatial coherence of the laser and an absence of diffraction patterns due to dust, microirregularities, etc. The second version has the advantage of possessing the capability of producing a series of shadow and interference patterns with a single exposed hologram. References 2: 1 Russian, 1 Western.

1/1

USSR

UDC 621.378.325

KUZIN, A. G., MIRGORODSKIY, N. S., PIKARNIKOV, V. P. and SOROKA, V. V.,
Leningrad Institute of Aviation Instrument Construction

PIEZOELECTRIC BENDING DEVICES FOR DEFLECTING A LIGHT RAY. I. THEORY
OF BIMORPH DEFLECTORS AND EXPERIMENTAL PROOF

Leningrad ZHURNAL TEKHNIЧЕСКОY FIZIKI in Russian Vol 46, No 9, Sep 76
pp 1935-1939 manuscript received 7 Jan 85 and 29 May 75

[Russian abstract provided by the source]

[Text] Of the low-frequency light deflectors, of considerable promise are the mirror devices for deflecting a light ray that use the bending oscillations of bimorph piezoelectric elements which are simple to make, have low losses of light and permit obtaining large angles of deflection with small dimensions and low power consumption. The authors examine the theory of oscillations of bimorph elements fixed at one end and loaded by the mass of the mirror at the other. They obtain general relationships which permit computing the amplitude and frequency characteristics of bimorph deflectors with different masses and dimensions of the plates and
1/2

USSR

KUZIN, A. G., MIRGORODSKIY, N. S., PIKARNIKOV, V. P. and SOROKA, V. V.,
ZHURNAL TEKHNIЧЕСКОY FIZIKI Vol 46, No 9, Sep 76 pp 1935-1939

mirrors and allowing for the electromechanical properties of the materials of the plates and intermediate layers. They give experimental proof of the relationships obtained and show that the theory and experiment give good agreement. References 5: 3 Russian, 2 Western.

2/2

USSR

UDC 621.378.325

KUZIN, A. G., MIRGORODSKIY, N. S., PIKARNIKOV, V. P. and SOROKA, V. V.,
Leningrad Institute of Aviation Machine Construction

PIEZOELECTRIC BENDING DEVICES FOR DEFLECTING A LIGHT RAY. II. INVESTIGATION
OF THE BASIC CHARACTERISTICS OF BIMORPH DEFLECTORS

Leningrad ZHURNAL TEKHNIЧЕСКОY FIZIKI in Russian Vol 46, No 9, Sep 76
pp 1840-1844 manuscript received 9 Jan 75 and 29 May 75

[Russian abstract provided by the source]

[Text] The authors examine the results of experimental investigations of the amplitude-frequency, phase and conversion characteristics of bimorph piezoelectric light deflectors when variable and constant voltages are fed to them; they have developed the design and investigated the parameters of the model of a multielement device. As a result of the investigations conducted they make conclusions as to the outlook for using bimorph deflectors to solve various specific problems. Reference 1 Russian.

1/1

USSR

UDC 532:537.226;541.135.1

KLIMKIN, V. F., MELEKHOV, A. V., PONOMARENKO, A. G. and SOLOUKHIN, R. I.

ULTRAHIGH-SPEED INTERFEROMETRY OF THE INITIAL STAGE OF DEVELOPMENT OF AN
ELECTRIC DISCHARGE IN LIQUID DIELECTRICS

Novosibirsk AEROFIZICHESKIYE ISSLEDOVANIYA [Aerophysics Research, Collection
of Works] in Russian No 5, 1975 pp 262-264

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7I269 by
I. A. Boriyev]

[Text] A Mach-Zehnder interferometer is used to record the interference patterns between two spherical electrodes in studying the initial stage of development of an electric discharge in a number of liquid dielectrics: water, acetone, n-hexane, ethyl alcohol and others differing in molecular structure. The intensity of the pulsed electric field in the gap between the electrodes was up to 1 MV/cm; the interelectrode space was exposed to pulsed ruby laser emission. It is established that under conditions of a quasihomogeneous electric field, regardless of the structure of the liquid, discharge is initiated from the positive electrode, although some variation is observed in the initial stage of development of the form of optical

1/2

USSR

KLIMKIN, V. F., MELEKHOV, A. V., PONOMARENKO, A. G. and SOLOUKHIN, R. I.,
AEROFIZICHESKIYE ISSLEDOVANIYA, No 5, 1975 pp 262-264

disturbances. The results show that the initial stage of onset of electric discharge in liquid dielectrics is associated with local release of energy on the surface of the electrodes that takes the form of a point explosion.

2/2

USSR

UDC 535.853

DERYUGIN, L. N., KUZALI, A. S. and CHEKAN, A. V.

CHARACTERISTICS OF MULTIBEAM SPECTRAL ANALYZERS WITH THIN-FILM FEED WAVEGUIDES

Leningrad OPTIKA I SPEKTROSKOPIYA in Russian Vol 41, No 3, Sep 76 pp 470-474
manuscript received 16 Jun 75

[Russian abstract provided by the source]

[Text] An examination is made of the spectroscopic capabilities of thin-film waveguides and devices for coupling emission out of them. It is shown that a thin-film waveguide with prismatic extraction of emission has a resolution of the same order as a classical diffraction grating with length equal to that of the emitting face of the prism. When diffraction gratings are fed by thin-film waveguides their resolution is considerably improved over classical gratings of the same length stimulated by plane waves. Ways are discussed to improve the effectiveness of spectrum analyzers on thin-film waveguides; consideration is given to the technological difficulties involved in obtaining high resolutions. References 8: 5 Russian, 3 Western.

1/1

USSR

UDC 535.317.1

DENISYUK, YU. N. and IKRAMOV, A.

CONCERNING THE SIGNAL-TO-NOISE RATIO WITH HOLOGRAPHIC REVERSAL OF THE PATH OF BEAMS THROUGH AN INHOMOGENEOUS PHASE MEDIUM

Leningrad OPTIKA I SPEKTROSKOPIYA in Russian Vol 41, No 3, Sep 76 pp 466-469
manuscript received 7 Jun 75

[Russian abstract provided by the source]

[Text] An examination is made of the principles governing noise formation when image distortions are compensated by the method of reversing the travel of rays through an optically inhomogeneous medium that introduces distortions. From the law of conservation of energy and certain obvious properties of the process of reversal, an expression is derived for the overall noise energy as a function of the relative fraction of energy of the reversed wave. It is implied by the nature of the proof that these noises are fundamental and cannot be eliminated by changing screen characteristics. The theoretical conclusions are experimentally confirmed. References 6: 1 Russian, 5 Western.

1/1

USSR

UDC 535.33+621.373:535

BULYCHEV, V. P., LADVISHCHENKO, YU. M., KHODOS, E. B. and BULANIN, M. O.

LASER MOLECULAR SPECTROSCOPY. DETERMINATION OF THE PARAMETERS OF VIBRATIONAL-ROTATIONAL LINES OF THE ν_2 INFRARED BAND IN AMMONIA

Leningrad OPTIKA I SPEKTROSKOPIYA in Russian Vol 41, No 3, Sep 76 pp 413-418
manuscript received 23 Oct 75

[Abstract] The pressure dependence of absorption of three emission lines of a cw CO₂ laser by gaseous ammonia was measured to determine the parameters of individual spectral lines of ¹⁴NH₃. The emission lines were R(14) and P(32) in the 10.6 μ m band and R(10) in the 9.4 μ m band. Coefficients of self-broadening of vibrational-rotational lines in the ν_2 band of ammonia were calculated from the experimental results by the Anderson and Murthy-Boggs methods. The results agree with the viewpoint that line shifts are in any case much less than line broadening when polar molecules interact. References 21: 19 Russian, 2 Western.

1/1

USSR

BAZYLEV, V. A., GLEBOV, V. I., DENISOV, E. I., ZHEVAGO, I. K. and KHLEBNIKOV, A. S., Institute of Atomic Energy imeni I. V. Kurchatov

ČERENKOV RADIATION AS AN INTENSE SOURCE OF X-RAYS

Moscow PIS'MA V ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI in Russian Vol 24, No 7, 5 Oct 76 pp 406-409 manuscript received 9 Aug 76

[Abstract] The condition for Čerenkov radiation on frequency ω is that the velocity v of a charged particle must exceed the phase velocity of light in the dielectric medium through which it travels. It is shown that for some materials this condition is satisfied in spectrally narrow frequency regions of the x-ray band close to the edges of photoabsorption of the internal shells of the atoms. As an example, the authors examine the inert gas argon, for which detailed theoretical and experimental data are available on the absorption spectrum. Calculations show that in a frequency interval $\Delta\omega = 25$ eV where the real part of the complex permittivity $\epsilon'(\omega) > 1$, Čerenkov emission may be stimulated on frequencies $\omega \approx 250$ eV. Only ultrarelativistic particles with energy of the order of the threshold energy $E_c = 500$ MeV or higher can be emitted. The angles of Čerenkov x-ray emission are very small, even for particles far above the threshold energy E_c . An examination is made of the

1/2

USSR

BAZYLEV, V. A., GLEBOV, V. I., DENISOV, E. I., ZHEVAGO, I. K. and KHLEBNIKOV, A. S., PIS'MA V ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI, Vol 24, No 7, 5 Oct 76 pp 406-409

features that distinguish conditions of observation and properties of emission from the analogous effect in the optical region. It is shown that intense Čerenkov x-radiation can be stimulated on a wavelength of 50 Å at angles between the vectors of electron velocity and photon momentum $\theta \approx 10^{-3} \pm 10^{-4}$ radian. References 5 Russian.

2/2

USSR

BAYANOV, V. I., BOYKO, V. A., VINOGRADOV, A. V., GULIDOV, S. S., PLYUKHIN, A. A., KATULIN, V. A., MAK, A. A., NOSACH, V. YU., PETROV, A. L., PEREGUDOV, G. V., PIKUZ, S. A., SKOBELEV, I. YU., STARIKOV, A. D., FAYENOV, A. YA., CHIRKOV, V. A. and YUKOV, YE. A., Physics Institute imeni P. N. Lebedev, Academy of Sciences of the USSR

ANOMALOUS INTENSITIES OF SATELLITES OF RESONANCE LINES OF HYDROGEN-LIKE IONS

Moscow PIS'MA V ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI in Russian Vol 24, No 26, 20 Sep 76 pp 352-357 manuscript received 10 Aug 76

[Abstract] An investigation is made of the effect of anomalous increase in the intensities of components of the satellite structure of resonance lines of hydrogen-like ions in emission of a dense laser plasma. An interpretation of the effect is given and a new method is proposed for measuring the electron density of the plasma in the range of $N_e \sim 10^{20} - 10^{23} \text{ cm}^{-3}$. It is shown that the anomaly can be explained by accounting for the possibility of transitions between doubly excited levels due to electron collisions. The proposed mechanism along with dielectronic recombination brings calculated intensities into total agreement with experiment. The method of determining N_e from the intensities of satellites has the following advantages: 1) in

1/2

USSR

BAYANOV, V. I., BOYKO, V. A. et al., PIS'MA V ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI, Vol 24, No 26, 20 Sep 76 pp 352-357

contrast to the resonance line, satellites do not experience effects of radiation capture which, generally speaking, may distort the integral intensity and shape of spectral lines; 2) the satellite wavelengths are close, so that spectrographs do not have to be calibrated. References 14: 11 Russian, 3 Western.

2/2

USSR

UDC 536.45.082.6;536.48.082.6;536.5/.6

DYATLOV, A. I., POGARSKIY, M. A. and SHAPOSHNIKOVA, T. A.

A THERMOSTAT FOR OPTICAL AND ELECTRICAL MEASUREMENTS IN THE RANGE OF 77-320 K

Leningrad TERMOSTAT DLYA OPTICHESKIKH I ELEKTRICHESKIKH IZMERENIY V INTERVALE 77-320 K in Russian, Leningrad Polytechnical Institute, 1976, 5 pp (manuscript deposited in VINITI, 25 Mar 76, No 934-76 Dep.)

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7I422 DEP]

[Text] A thermostat design is proposed for optical and electrical measurements in the 77-320 K temperature range. Provision is made for thorough shielding of the study specimen from background illumination. The number of reflecting surfaces on the beam path is considerably reduced. Facilities are provided for moving the specimen during measurements. Time for reaching steady-state working conditions is 2 minutes or less. Nitrogen consumption is 0.5 liter per hour or less.

1/1

USSR

UDC 534

KUCHERENKO, V. P., KOVTUN, A. V. and PROTSENKO, O. P., Institute of Mechanics, Ukrainian SSR Academy of Sciences, Kiev

ON ONE PROBLEM OF VIBRATION PROTECTION OF A SOLID SUSPENDED IN A FLOW OF LIQUID ON VIBRATING SUPPORTS

Kiev PRIKLADNAYA MEKhanika in Russian Vol 12(22), No 9, Sep 76 pp 104-108
manuscript received 10 Dec 75

[Russian abstract provided by the source]

[Text] The authors examine the spatial vibrations of a solid in a flow of liquid, fastened by elastic shock absorbers to vibrating supports. They investigate the most typical cases of resonance situations and find the conditions under which the vibrations of the solid will be damped.
References 9 Russian.

1/1

USSR

UDC 534.131:539.312

FRIDMAN, L. I., Kuybyshev

USING THE "TRAVELING-WAVE" METHOD TO SOLVE THE DYNAMIC PROBLEM OF LOADING AN ELASTIC MEDIUM

Kiev PRIKLADNAYA MEKhanika in Russian Vol 12(22), No 9, Sep 76 pp 30-35
manuscript received 26 Nov 74

[Russian abstract provided by the source]

[Text] The author examines a dynamic polar-symmetric boundary value problem for an elastic medium. The concept of solving a differential in displacements in D'Alembert form is used. For each segment of time corresponding to the movement of the spherical wave front from one boundary surface of the sphere to another, the boundary conditions give differential equations relative to the wave function of the reflected wave; the second member of the equation includes the predetermined wave function of the incident wave. The first wave function is determined from the load given as a function of time. As an example the author cites the results from computing stresses in the case of applying a load to the outer surface of the sphere. References 4: 2 Russian, 2 Western.

1/1

USSR

UDC 539.3:534.231.1

GOLOVCHAN, V. T. and GUZ', A. N., Ukrainian Scientific Research Institute of Hydraulic Engineering and Land Reclamation, Institute of Mechanics, Academy of Sciences Ukrainian SSR, Kiev

PROPAGATION OF SHEAR WAVES IN AN ELASTIC LAYER PERFORATED WITH A SERIES OF CYLINDRICAL HOLES

Kiev PRIKLADNAYA MEKHANIKA in Russian Vol 12(22), No 9, Sep 76 pp 18-23
manuscript received 18 Sep 75

[Russian abstract provided by the source]

[Text] The authors present a solution to the problem of propagation of free shear waves in an elastic layer containing a series of identical cylindrical holes. The shape and velocity of these waves are determined from an infinite system of homogeneous algebraic equations which allow finding the solution by the method of reduction. References 4 Russian.

1/1

USSR

UDC 534.833.524

AVILOVA, G. M., MATVEYEV, YU. I., TARTAKOVSKIY, B. D. and SHVILKINA, O. G., Acoustics Institute, Academy of Sciences USSR

THE CALCULATION OF ANTISYMMETRIC VIBRATIONS OF SANDWICH STRUCTURES

Moscow AKUSTICHESKIY ZHURNAL in Russian Vol 22, No 5, Sep/Oct 76 pp 762-764
manuscript received 8 Dec 75

[Abstract] A widely used model for the calculation of the zero mode of antisymmetric oscillations of a metal-polymer-metal sandwich assumes that the outer metal layers undergo bending and extension, while the middle layer is subjected to bending and shear. However, the frequency boundary of applicability of this method is unknown. In order to estimate the boundaries of applicability of the initial assumptions upon which this model is based, the authors calculated the dispersion characteristics of the phase velocity of the zero mode of antisymmetrical oscillations as a function of frequency, using approximate and exact formulas. Calculation of the phase velocity and corresponding bending rigidity and loss factor using the old, approximate formulas yields good agreement with the results of calculations by the newer, exact formulas right up to frequencies where thickness

1/2

USSR

AVILOVA, G. M., MATVEYEV, YU. I., TARTAKOVSKIY, B. D. and SHVILKINA, O. G.,
AKUSTICHESKIY ZHURNAL Vol 22, No 5, Sep/Oct 76 pp 762-764

resonances arise in the middle layer. It is noted that for most cases of practical interest, the frequency of the first thickness resonance of the polymer layer is above the audio frequency range. References 4: 1 Russian, 3 Western.

2/2

USSR

UDC 536.45.082.6;536.48.082.6;536.5/.6

DOBRYANSKIY, V. M., KOROTKAYA, E. I., RUD', V. G. and CHIZHIK, A. I.

HIGH-PRESSURE MEASUREMENT IN THE LOW-TEMPERATURE REGION

Minsk STRUKTURA I SVOYSTVA SEGNETOELEKTRIKOV [Structure and Properties of Ferroelectrics, Collection of Works] in Russian, 1975 pp 78-81

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7I442 (résumé)]

[Text] The authors consider the use of manganin manometers as secondary instruments for measuring high pressures at low temperatures. A detailed description is given of the technique for making the manganin sensors, the process of aging and calibrating them. $R = f(T)$ and $R = F(P)$ curves are plotted from which the pressure can be found that corresponds to the measured resistance of a manganin sensor located in the chamber at any temperature.

USSR

UDC 535.21

BARCHUKOV, A. I., BUNKIN, F. V., KONOV, V. I., KONONOV, N. N., KUZ'MIN, G. P., MESYATS, G. A. and CHAPLIYEV, N. I., Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR, Moscow

EXPLOSIVE MECHANISM OF PRESSURE AGAINST SOLID TARGETS EXPOSED TO PULSED CO₂ LASER EMISSION

Moscow KVANTOVAYA ELEKTRONIKA in Russian Vol 3, No 7(49), Jul 76 pp 1534-1542
manuscript received 25 Nov 75

[Russian abstract provided by the source]

[Text] An investigation is made of the effect that the plasma formed by optical breakdown of air has on solid targets of different shapes (disk, hemispherical and parabolic reflectors). The emission source was a CO₂ TEA laser with energy up to ~1 kJ. The authors determine the optimum duration of the laser pulse required to maximize the specific pressure pulses I/E (I is the pressure pulse, E is the energy in the light pulse) against flat targets produced by the plasma resulting from low-threshold breakdown of air close to their surface. An investigation is made of the mechanical action of the air-breakdown plasma produced by a focusing lens at the center of curvature

1/2

USSR

BARCHUKOV, A. I., BUNKIN, F. V., KONOV, V. I., KONONOV, N. N., KUZ'MIN, G. P., MESYATS, G. A. and CHAPLIYEV, N. I., KVANTOVAYA ELEKTRONIKA, Vol 3, No 7(49), Jul 76 pp 1534-1542

of hemispheres against hemispherical targets. The resultant data are interpreted on the basis of point explosion theory with consideration of atmospheric back pressure. Control experiments are done with hemispherical and parabolic reflectors acting simultaneously as the receivers of pressure from the air-breakdown plasma formed in their focal region. References 13:
7 Russian, 6 Western.

2/2

GRIGOLYUK, E. I., Associate Member of the Soviet Academy of Sciences, and
KUZNETSOV, YE. B., Moscow Aviation Institute

A CONICAL SHELL EXPOSED TO A WEAK SHOCK WAVE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 230, No 2, 11 Sep 76
pp 300-301 manuscript received 6 Apr 76

[Abstract] When an acoustic shock wave is incident on a shell in an ambient fluid, the total pressure acting on the shell can be represented as the sum of three components: the pressure in the oncoming wave, the pressure of diffraction by the stationary rigid shell, and the pressure of radiation due to deformation of the shell and displacement as a solid. In this paper an expression is presented in explicit form for the pressure of radiation acting on a conical shell in the case of axisymmetric deformation. The expression holds for any instant of time. The final expression takes the form

$$p(r, \theta, \tau) = \frac{\rho c^2}{2\pi i} \int_0^\infty \int_0^\pi \int_0^{2\pi} \frac{\partial^2 w}{\partial \tau^2} F(v, \theta, \tau) \sin \theta d\theta d\phi dv$$

where

1/2

$$F(v, \theta, \tau) = \frac{1}{2\pi i} \int_0^{2\pi} \int_0^\pi \int_0^\infty \frac{\partial^2 w}{\partial \tau^2} \Psi(r, s) \sin \theta d\theta d\phi ds$$

USSR

$$\Psi(r, \theta, s) = \int_0^\infty \frac{J_0(\sqrt{r^2 - s^2} \sqrt{1 - \cos^2 \theta})}{\sqrt{1 - \cos^2 \theta}} \frac{J_0(\sqrt{s^2 - r^2} \sqrt{1 - \cos^2 \theta})}{\sqrt{1 - \cos^2 \theta}} ds$$

GRIGOLYUK, E. I. and KUZNETSOV, YE. B., DOKLADY AKADEMII NAUK SSSR, Vol 230, No 2, 11 Sep 76 pp 300-301

$\Psi(r, s)$ is the inversion of a Bessel transform for given associated Legendre polynomials, r is the radius of the given spherical coordinate system, $\tau = ct/R$, c is the speed of sound in the fluid, t is elapsed time from the instant when the shock wave contacts the shell, R is a characteristic dimension of the shell, θ is the angle of the coordinate system, θ_0 is the semivertex angle of the cone, ρ is the mass density of the fluid and w is flexure of the shell. References 6 Russian.

BERDICHEVSKIY, V. L., Moscow State University imeni M. V. Lomonosov

ON THE RATE OF ATTENUATION OF STRESSES IN CYLINDRICAL ELASTIC SOLIDS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 230, No 3, 21 Sep 76
pp 549-552 manuscript received 24 Mar 76

[Abstract] In a long elastic cylindrical rod with certain restrictions on boundary conditions, stresses decay exponentially when one end is struck. To determine the rate of attenuation (exponential function) one may assume that the rod is semi-infinite and find displacements w^l in the form of a series with respect to functions of the form $u^l(x^\alpha)e^{-\kappa x}$ ($x \geq 0$ is the coordinate along the axis of the rod, x^α are the coordinates in the plane of the cross section, Greek letters take the values 1, 2, Roman letters take the values 0, 1, 2, the value 0 is given to projections on the x -axis). Substitution in the equilibrium equations leads to a boundary value problem for eigenvalues in which κ are eigenvalues, and the $u^l(x^\alpha)$ are eigenfunctions. This problem is non-self-adjoint, and therefore the κ are complex, and the $u^l(x^\alpha)$ are nonorthogonal. In certain cases the eigenfunctions can be constructed explicitly and transcendental equations can be derived to determine the κ . In more general situations one must not count on either the

1/2

USSR

BERDICHEVSKIY, V. L., DOKLADY AKADEMII NAUK SSSR, Vol 230, No 3, 21 Sep 76
pp 549-552

construction of an exact solution or on setting up an equation for the κ . In this connection, it becomes of interest to evaluate the minimum value δ of the positive real parts of the eigenvalues κ . In this paper the author outlines a simple method of evaluation that in many instances gives numerical results. References 10: 5 Russian, 5 Western.

2/2

Superconductivity

USSR

PALISTRANT, M. YE. and TRIFAN, A. T.

SPIN RESOLUTION OF THE DENSITY OF ELECTRON STATES OF THIN SUPERCONDUCTING FILMS IN A MAGNETIC FIELD UNDER PRESSURE

Kishinev VLIYANIYE VNESHNIKH VOZDEYSTVIY NA SVERKHPROVODYASHCHIYE SVOYSTVA METALLOV [Influence of External Effects on the Superconducting Properties of Metals, Collection of Works] in Russian, Shtiintsa, 1975 pp 17-38

[From REFERATIVNYY ZHURNAL, FIZIKA No 6(II) 1976 Abstract No 6Yel090 by the authors]

[Text] The authors examine a superconductor in which a very narrow energy band or flat band segment near the Fermi level exists. They obtain analytical expressions for the densities of electron states in thin films of such superconductors in a magnetic field in the entire energy range $(0, \infty)$ and at near-critical pressures. The pressure leads to a substantial additional contribution to spin splitting of the densities of electron states of films in a magnetic field.

1/1

USSR

GARABAZHIU, V. F. and KOLPAZHIU, M. K.

INFLUENCE OF PRESSURE AND IMPURITY ON THE CURRENT STATE OF A SUPERCONDUCTING FILM

Kishinev VLIYANIYE VNESHNIKH VOZDEYSTVIY NA SVERKHPROVODYASHCHIYE SVOYSTVA METALLOV [Influence of External Effects on the Superconducting Properties of Metals, Collection of Works] in Russian, Shtiintsa, 1975 pp 38-46

[From REFERATIVNYY ZHURNAL, FIZIKA No 6(II) 1976 Abstract No 6Yel091 by the authors]

[Text] The authors investigate the influence of Van Hove singularities on the current state of homogenous thin superconducting films with nonmagnetic and paramagnetic impurities. In the limiting case of large concentrations of impurities, when electron scattering on the film boundaries can be ignored, a system of equations is obtained which fully determine the stationary state of the superconducting film under pressure in the presence of impurities. For Fermi energies far from critical points, the authors compute the current density and ordering parameter as functions of pressure and impurity concentration.

1/1

USSR

MOSKALENKO, V. A., VLADIMIR, M. I. and NIKA, YU. N.

INFLUENCE OF A PARAMAGNETIC IMPURITY ON THE AMPLITUDES OF A TUNNEL CURRENT

Kishinev VLIYANIYE VNESHNIKH VOZDEYSTVIY NA SVERKHPROVODYASHCHIYE SVOYSTVA METALLOV [Influence of External Effects on the Superconducting Properties of Metals, Collection of Works] in Russian, Izd-vo Shtiintsa, 1975 pp 13-17

[From REFERATIVNYY ZHURNAL, FIZIKA No 6(II) 1976 Abstract No 6Yel1111 by A. F. Volkov]

[Text] On the basis of the known expression for a current $I(t)$ through a tunnel Josephson junction the authors analyze the influence of paramagnetic impurities in electrodes on the quantity $I(t)$. They make a detailed investigation of the influence of impurities on the singularities in the current amplitude of pairs, interference and quasiparticle currents at a voltage of $V = \omega_q + \omega_q'$, where ω_q and ω_q' are the energy gap of the one-particle spectrum of the left and right electrodes. The authors demonstrate that the presence of impurities leads to a smoothing of the singularity.

1/1

USSR

DOLGOPOLOV, V. T. and MURZIN, S. S., Institute of Solid State Physics, Academy of Sciences USSR

INFLUENCE OF AN ALTERNATING FIELD ON THE SUPERCONDUCTIVE TRANSITION IN TIN

Moscow PIS'MA V ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI in Russian Vol 24, No 7, 5 Oct 76 pp 434-437 manuscript received 31 Aug 76

[Abstract] Experiments were done to measure the displacement of the superconductive transition in tin under the influence of an electromagnetic field alternating at radio frequency. The single-crystal specimen was placed in a cylindrical inductance coil that set up the field. The first coil was placed within a second coil that acted as a receiver. The superconductive transition was determined from the emf arising in the pickup coil as the magnetic field was pushed out at the instant of transition from the normal to the superconductive state, or with penetration of the field into the specimen in the reverse transition. The variable fields had frequencies from 10^6 to 10^3 Hz. It was found that the alternating field not only shifts the transition point, but also deforms the transition curve. Curves are given showing the displacement as a function of field amplitude. It was found that the shift decreases sharply as the direction of the field deviates from the axis of the specimen. References 6: 3 Russian, 3 Western.

1/1

USSR

LEBEDEV, V. V., Institute of Theoretical Physics imeni L. D. Landau, Academy of Sciences USSR

ROTON SPECTRUM IN SUPERFLUID $\text{He}^3\text{-He}^4$ SOLUTIONS

Moscow ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI in Russian Vol 71, No 3(9), Sep 76 pp 1225-1238 manuscript received 29 Mar 76

[Russian abstract provided by the source]

[Text] An examination is made of the spectrum of rotons in superfluid $\text{He}^3\text{-He}^4$ solutions with consideration of the interaction between impurity excitations and rotons. An equation is derived for the self-energy function of rotons within the framework of a model that assumes point interaction between impurity excitations and rotons. This equation is solved by numerical integration on a computer. The resultant solutions are used to find the thermodynamic characteristics of rotons and the energy behavior of cross sections of various scattering processes involving rotons. References 16: 11 Russian, 5 Western.

1/1

USSR

BULYZHENKO, I. E. and IVLEV, B. I., Institute of Theoretical Physics imeni L. D. Landau, Academy of Sciences USSR

CONCERNING THE SPEED OF SOUND IN SUPERCONDUCTORS

Moscow ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI in Russian Vol 71, No 3(9), Sep 76 pp 1172-1179 manuscript received 25 Mar 76

[Russian abstract provided by the source]

[Text] An examination is made of the influence that nonlinear effects arising when sound propagates in semiconductors have on the temperature dependence of the speed of sound. It is shown that the experimentally observed change in this dependence with increasing sound wave amplitude can be interpreted on the basis of concepts of specific heating of the electron gas. It is shown in addition that the minimum in the temperature dependence of the speed of transverse sound is retained at the "dirty" limit in contrast to the result obtained on the basis of the two-fluid model of superconductivity. References 12: 9 Russian, 3 Western.

1/1

USSR

VOLOVIK, G. YE. and MINEYEV, V. P., Institute of Theoretical Physics imeni L. D. Landau, Academy of Sciences USSR, Institute of Solid State Physics, Academy of Sciences USSR

HYDRODYNAMICS OF THE A-PHASE OF SUPERFLUID He^3

Moscow ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI in Russian Vol 71, No 3(9), Sep 76 pp 1129-1144 manuscript received 19 Feb 76

[Russian abstract provided by the source]

[Text] Based on a kinetic equation for the quasi-particle distribution function and considerations of gradient invariance the authors derive a complete system of linear equations of hydrodynamics of the A-phase of superfluid He^3 . All thermodynamic quantities are found, and the kinetic coefficients in the τ -approximation that enter into the equations are expressed in terms of the Fermi-fluid parameters of Landau theory. It is shown that within the limits of applicability of hydrodynamics $\omega\tau \ll 1$ there are two frequency regions in which the equation of motion for the vector of the orbital moment is fundamentally different. At low frequencies it is a diffusion equation, and at higher frequencies it describes the propagation of weakly damped orbital waves with a linear dispersion law. References 18: 3 Russian, 15 Western.

1/1

USSR

TEPLOV, A. A., MIKHEYEVA, M. N., GOLYANOV, V. M. and GUSEV, A. N., Institute of Atomic Energy imeni I. V. Kurchatov

SUPERCONDUCTIVE TRANSITION TEMPERATURE, CRITICAL MAGNETIC FIELDS AND STRUCTURE OF VANADIUM FILMS

Moscow ZHURNAL EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI in Russian Vol 71, No 3(9), Sep 76 pp 1122-1128 manuscript received 18 Feb 76

[Russian abstract provided by the source]

[Text] The authors studied the superconductive transition point T_c , perpendicular critical magnetic fields H_{cl} , electrical resistance and structure of vanadium films produced by ionic sputtering in an ultravacuum installation. The films were protected from external factors by application of a carbon backing and covering 15 Å thick. The critical fields were measured by a resistive method. With a reduction in the thickness of the films from 2900 to 60 Å, a decrease was observed in T_c from 5.1-5.2 to 2.4 K, and an increase in residual resistivity ρ_n from 4.5 to 20 $\mu\Omega\cdot\text{cm}$, as well as a rise in the derivative $|dH_{cl}/dT|$ close to T_c from $2.9\cdot 10^5$ to $5.3\cdot 10^5 \text{ A}\cdot\text{m}^{-1}\text{K}^{-1}$. Superconductivity was not observed down to 1.3 K in a film 30 Å thick. The crystal

USSR

TEPLOV, A. A., MIKHEYEVA, M. N., GOLYANOV, V. M. and GUSEV, A. N., ZHURNAL
EKSPERIMENTAL'NOY I TEORETICHESKOY FIZIKI, Vol 71, No 3(9), Sep 76 pp 1122-1128

structure type and lattice constant of films 125-1000 Å thick as determined from the electron diffraction pattern coincided with those for bulk vanadium; grain size in these films was 500-800 Å. The electron density of states $N(0)$ calculated from data on $|dH_{cl}/dT|$ and ρ_n for thick films (720-2900 Å) coincides with the value of $N(0)$ for bulk vanadium (assuming that the coefficient η accounting for the correction for strong coupling effects for H_{c2} is equal to 1.2). With a reduction in film thickness to 60 Å, $N(0)$ decreases by a factor of about 2. The results agree with the hypothesis that strong changes in $N(0)$ affecting T_c can be observed in films of transition metals due to a reduction in the mean free path of electrons. However, the resultant quantitative information relative to $N(0)$ in thin films of vanadium ($d \leq 250$ Å) is sensitive to the presence of a hypothetical surface layer, its properties and its thickness. References 21: 7 Russian, 14 Western.

2/2

USSR

UDC 621.039.31

LAGUNTSOV, N. I., LEVIN, YE. V. and SULABERIDZE, G. A.

COMPUTER CALCULATION OF UNSTEADY PROCESSES IN MULTISTAGE CASCADES FOR SEPARATING TWO-COMPONENT ISOTOPE MIXTURES

Minsk INZHENERNO-FIZICHESKIY ZHURNAL in Russian Vol 31, No 3, Sep 76 pp 506-513
manuscript received 23 Jul 75

[Russian abstract provided by the source]

[Text] Equations are derived that describe the unsteady process of separation in arbitrary square-step and ideal cascades for reversible and irreversible methods of separation. A differential-difference mathematical model is proposed that permits transition from the boundary value problem to the Cauchy problem. Based on a systems method of integrating the differential equations, a computer technique is worked out for numerical calculation of the unsteady process.

The dynamic characteristics of square-step and ideal cascades are studied. It is shown that the ideal cascade model is applicable to calculation of an unsteady process in square-step cascades with high shape efficiency. The paper gives the results of calculation of transient processes in cascades with an exhaustive section and an "infinite reservoir" in the supply. References 12 Russian.

1/1

USSR

UDC 531.389

DZHAGAROV, G. A., The Military and Scientific Society for the Central House of the Soviet Army imeni M. V. Frunze, Moscow

ON THE AUTOMATIC COMPENSATION OF ERRORS IN GYROSTABILIZERS

Kiev PRIKLADNAYA MEKHANIKA in Russian Vol 12(22), No 9, Sep 76 pp 124-129
manuscript received 14 Jan 75

[Russian abstract provided by the source]

[Text] The author investigates drifts in gyrostabilized platforms caused by inequality in the parameters of kinematically connected gyroscopes acted on by harmonic angular and linear perturbations. He shows that the platform, whose input axes rotate around an axis that is collinear with the output axes of the gyroscopes, has no drift relative to the two axes. This is unlike the platform whose input axes are fixed relative to the platform and also unlike those platforms whose input axes rotate around an axis that is collinear with the axes of the natural rotation of the gyroscope rotors. References 2 Russian.

1/1

USSR

UDC 534.241

METSAVEER, YA. and PIKK, YU., Institute of Cybernetics, Academy of Sciences
Estonian SSR

ECHO SIGNAL OF A FINITE PULSE REFLECTED FROM A CYLINDRICAL SHELL FILLED WITH
LIQUID

Tallin IZVESTIYA AKADEMII NAUK ESTONSKOY SSR, FIZIKA, MATEMATIKA in Russian
Vol 25, No 3, 1976 pp 260-268 manuscript received 23 Dec 75

[Russian abstract provided by the source]

[Text] A method is proposed for calculating the echo signal of a plane
finite pressure pulse reflected from a liquid-filled elastic cylindrical
shell immersed in an infinite fluid. Both the ambient medium and the liquid
filling the shell are modeled in the linear theory of an ideal compressible
fluid. The motion of the shell is described by the linear theory of thin
shells of the Timoshenko type. The problem is solved by using integral
Fourier transformation with respect to time, and Watson transformation with
respect to angular coordinate. The mechanisms of formation of the different
components of the echo signal are presented. References 10: 5 Russian,
5 Western.

1/1

USSR

UDC 532.59:533.001:531.466

OVSYANNIKOV, L. V.

THE CAUCHY-POISSON PROBLEM ON A SPHERE

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA: MATEMATIKA, MEKHANIKA, ASTRO-
NOMIYA in Russian No 3, Jul 76 pp 146-153 manuscript received 12 Mar 76

[Russian abstract provided by the source]

[Text] The paper gives an introduction to the exact theory of the Cauchy-
Poisson problem of waves on the surface of an ideal incompressible fluid
that covers an attracting sphere with a layer of finite depth and is in a
state of unsteady potential motion. The initial equations are given in
invariant vector form on a unit sphere. Equations are examined for two
approximate theories -- the linear theory and the shallow-water theory.
An analogy is established between gasdynamics equations on a sphere and
shallow-water equations on a sphere. A program is formulated for rigorous
substantiation of these approximate theories, and a procedure is outlined
for carrying out this program. References 7: 6 Russian, 1 Western.

1/1

123

ABGARYAN, A. A., All-Union Scientific Research Institute of Physical Optics Measurements

ON RANDOM OSCILLATIONS OF A SPACE VEHICLE IN A LUMINOUS FLUX

Yerevan IZVESTIYA AKADEMII NAUK ARMYANSKOY SSR, MEKHANIKA in Russian Vol 29, No 4, 1976 pp 41-46 manuscript received 28 Aug 75

[Abstract] Under the influence of such factors of outer space as deep vacuum, intense radiation and so forth there are unavoidable changes in the optical properties of control surfaces of space vehicles, and consequently the degree of interaction between the vehicle and light flux must change. In this connection the author examines the problem of small torsional oscillations of a vehicle oriented by the solar luminous flux with variable optical characteristics. The vehicle is assumed to be a black and white cylinder with the boundaries of the black section along longitudinal generatrices slightly above the boundary of symmetry of the surface. An expression is derived for the torque with small angles of deviation from orientation toward the sun with consideration of time-variable coefficients of absorption of the black and white sections. References 15: 13 Russian, 2 Western.

1/1

Thermodynamics

USSR

UDC 536.45.082.6;536.48.082.6;536.5/.6

STANIK, A. M.

EFFICIENCY OF DESIGN OF COPPER CURRENT LEADS FOR A HELIUM CRYOSTAT

TRUDY NAUCHNO-ISSLEDOVATEL'SKOGO INSTITUTA YADERNOY FIZIKI, ELEKTRONIKI I AVTOMATIKI PRI TOMSKOM POLITEKHNICHESKOM INSTITUTE [Transactions of the Scientific Research Institute of Nuclear Physics, Electronics and Automation Affiliated with Tomsk Polytechnical Institute] in Russian No 5, 1975 pp 79-88

[From REFERATIVNYY ZHURNAL, FIZIKA No 7, 1976 Abstract No 7I419 by P. S. Bulkin]

[Text] An engineering method is proposed for finding and selecting optimum current leads for a cryostat under conditions of nonideal heat exchange with the coolant vapor. The heat balance equation for current leads with a stepped piecewise-constant cross section was solved simultaneously with the equation of heat exchange with the coolant vapors (helium). An empirical approximation was used for the temperature dependence of the coefficient of thermal conductivity and heat capacity of the copper. The problem was solved by the method of successive iterations with stitching of solutions at the boundaries on a medium-speed digital computer. The optimum cross sections

1/2

USSR

STANIK, A. M., TRUDY NAUCHNO-ISSLEDOVATEL'SKOGO INSTITUTA YADERNOY FIZIKI, ELEKTRONIKI I AVTOMATIKI PRI TOMSKOM POLITEKHNICHESKOM INSTITUTE, No 5, 1975 pp 79-88

and lengths of steps are calculated for leads 100 mm long and currents up to 400 A. It is shown that the cross section must have a minimum close to the cold end of the lead. It is noted that an oversized cross section leads to a less abrupt increase in coolant consumption than does an undersized cross section.

2/2

CSO: 1862

- END -